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MACROINVERTEBRATES OF LUXAPALILA CREEK, MISSISSIPPI AND ALABAMA, 1987-89

by

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13. ABSTRACT *(Maximum 200 words)*

A survey of the macroinvertebrate community of four pools and four riffles in Luxapalila Creek, Mississippi and Alabama, was conducted in 1987-89. The purpose was to collect preconstruction data before the creek is impacted by selective clearing and snagging, bank protection, construction of notched sills, and a fabric dam. Luxapalila Creek can be characterized as exhibiting high macroinvertebrate species richness, diversity, and equitable distribution of chironomid (midge) larvae and oligochaete (worm) species. These two groups dominated the fauna and comprised 77 and 62 percent of the macroinvertebrates in pools and riffles, respectively. Total macroinvertebrate density was lower although more stable in pools (6,433-7,229 individuals/sq m) than in riffles where it was higher and more variable (9,662-28,820 individuals/sq m). Species richness of chironomids appeared to be greater in pools than riffles probably because of drift out of riffles and into pools. High winter discharge led to greatly reduced macroinvertebrate densities in all riffles and in two pools

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during the spring of 1989. Post-construction biological monitoring will determine if community composition and total density is affected by proposed channel modifications.

PREFACE

In September 1987, the US Army Engineer Waterways Experiment Station (WES) initiated invertebrate studies on Luxapalila Creek, Mississippi and Alabama, for the US Army Corps of Engineers, Mobile District (CESAM). The purpose was to collect baseline information on invertebrates to evaluate the effects of proposed channel modifications.

This report was prepared by Dr. Barry S. Payne, Dr. Andrew C. Miller, Ms. Christina Miller-Way, and Mr. C. Rex Bingham, all of the Aquatic Habitat Group (AHG), WES. Mr. Edwin Theriot was Chief, AHG, Dr. Conrad J. Kirby was Chief, Environmental Resources Division, and Dr. John Harrison was Chief, Environmental Laboratory, WES, during preparation of this report. Mr. Brian Peck, CESAM, monitored the study and reviewed an early draft of the report. The report was edited by Ms. Janean C. Shirley of the WES Information Products Division, Information Technology Laboratory.

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CONTENTS

CONVERSION FACTORS, NON-SI TO SI (METRIC) UNITS OF MEASUREMENT

Non-SI units of measurement used in this report can be converted to SI (metric) units as follows:

Multiply	By	To Obtain
cubic feet per second	0.02831685	cubic metres per second
feet	0.3048	metres
gallons (US liquid)	3.785412	cubic decimetres
inches	2.54	centimetres
miles (US statute)	1.609347	kilometres
square miles	2.589998	square kilometres

MACROINVERTEBRATES OF LUXAPALILA CREEK,
MISSISSIPPI AND ALABAMA, 1987-89

PART I: INTRODUCTION

Background

1. The US Army Corps of Engineers, Mobile District (CESAM) is preparing a flood control plan for Luxapalila Creek, Mississippi and Alabama. The project area includes the lower reach of the creek, from its mouth to river mile (RM) 25.5. The current plan calls for selective clearing and snagging, bank protection, and construction of notched sills, excavation of pools, and a fabric dam. Proposed channel modifications would protect rural areas upstream of Columbus, MS, against floods expected to occur every 1.5 years, and urban areas within Columbus would be protected against floods expected every 5 years.

2. Many aquatic habitats are altered by channel diversion, modification, or construction of dams (Standford and Ward 1979). This demand on lotic habitats has brought about an interest in habitat improvement or development to mitigate losses caused by man's activities. For example, the fabric dam and other modifications proposed for Luxapalila Creek would help to provide access to the upper watershed by walleye for 45 percent of their critical spawning migration period (US Fish and Wildlife Service 1987). A wide array of measures, including construction of sills, artificial riffles, ponds, and planting of riparian vegetation, have been used to improve habitat for aquatic biota in streams throughout the United States (Shields 1983; Woods and Griswold 1981; US Soil Conservation Service 1971a, 1971b; King, Miller, and Glover 1982; Miller 1987.

Purpose and Scope

3. The purpose of this study was to obtain baseline data on sediment characteristics and benthic invertebrates at Luxapalila Creek, Mississippi and Alabama. This information will be used by CESAM to evaluate the effects of proposed channel alterations and mitigation measures on selected reaches of the creek.

PART II: STUDY AREA AND METHODS

Study Area

4. Luxapalila Creek is located in northeast Mississippi and northwest Alabama (Figure 1). The creek originates in southern Marion County near Winfield, AL and flows in a southerly and then a southwestern direction for about 75 miles* before joining the Tombigbee River at RM 362.35. The drainage basin includes 794.5 square miles of mainly forested and agricultural land that is relatively unaffected by urban development. Riparian vegetation consists of bald cypress (*Taxodium distichum*), river birch (*Betula nigrum*), maples (*Acer* spp.) and oaks (*Quercus* spp.).

5. The study area included approximately 30 miles of Luxapalila Creek in Lowndes County, Mississippi, and Lamar County, Alabama. In this reach the creek consists of riffles, runs, and short pools. Most pools are narrow, comparatively shallow, and appear to function more like runs than pools. Substrate in the riffles consists of gravelly sand with very little cobble or bedrock. A 26-mile segment of the creek between Winfield, AL and the Alabama-Mississippi State line was channelized in 1922. In 1967 the lower 2.1 miles of Luxapalila Creek was channelized (Arner et al. 1976; US Army Corps of Engineers 1986; US Fish and Wildlife Service 1987).

6. Luxapalila Creek is near the northern edge of the Gulf Coastal Plains Physiographic Province. The topography is hilly and ranges from low, smoothly rounded hills of 40-50 ft relief within broad intervening valleys to hills and ridges up to 200 ft high separated by narrow valleys with steeply sloping sides. The basin has a temperate climate characterized by long, warm summers, and short, usually mild winters. The basin receives abundant rainfall that is fairly well distributed throughout the year. Annual rainfall at Columbus from 1951 to 1980 was 56.75 in.

7. Four sampling sites, each consisting of a single pool and a nearby riffle, were located on Luxapalila Creek. Sites 1-3 were within the reach to be modified by proposed channel alterations. Site 4, which is in a previously channelized reach, was upstream of proposed channel modifications. The following is a brief description of the four sites surveyed. More detailed data

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* A table of factors for converting non-SI to SI (metric) units is presented on page 3.

on sediments and water chemistry at each site can be found in Part III of this report.

Site 1

8. At the site closest to the mouth of the creek (Figure 1) the channel was braided and approximately 80 ft wide. Substrate in the riffle consisted of firm gravel over hardpan clay. There was no submersed vegetation present, although the emergent macrophyte water willow (*Justicia americana*) had colonized gravelly shoals along the left descending bank.

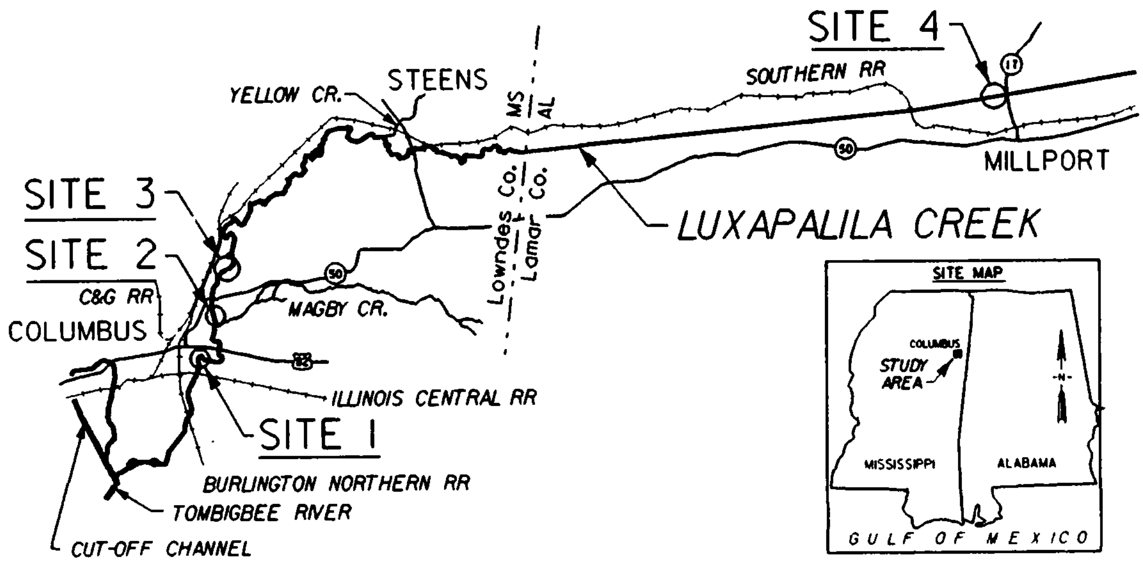


Figure 1. Study sites on Luxapalila Creek, Mississippi and Alabama

9. The pool at site 1 was located approximately 500 ft upriver of the riffle. Approximately 20 percent of the substrate in the lower reach of the pool, where samples were taken, was stabilized by logs or other large snags. Substrate consisted of sand overlain by a 2-in. layer of pea gravel. Canopy coverage was approximately 20 percent and there was no submersed or emergent vegetation in the pool.

Site 2

10. The riffle at site 2 was approximately 50 ft wide and was bordered by extensive stands of *J. americana*. The gravel was colonized by scattered clusters of *Sparganium:* sp. covered by an unidentified algae. The riparian canopy was open.

11. The pool, which was located approximately 100 ft downstream, was approximately 100 ft wide. Substrate consisted primarily of sand and silt overlain by a layer of leaf litter and twigs. Snags were present in the pool, but to a lesser extent than at site 1. No emergent or submersed vegetation

was observed. The riparian cover, which consisted of *T. distichum* and water oak (*Quercus nigra*), covered approximately 50 percent of the channel. Banks were low, 3-4 ft high, and stable.

Site 3

12. The riffle at site 3 was about 50 ft wide, and exposed gravel bars were colonized by *J. americana*. Substrate consisted mainly of gravel that appeared to be slightly less consolidated than in the riffle at site 2 but more consolidated than gravel at site 1. There were no snags in the channel and no riparian cover.

13. The pool was located approximately 1,500 ft downstream of the riffle and 500 ft upstream of a US Geological Survey (USGS) discharge gage (No. 02443500 near Columbus, MS). No submersed vegetation was present and the riparian vegetation did not form a noticeable canopy. *Justicia americana* was present along the border of the pool, but to a lesser extent than in the riffle.

Site 4

14. This site, which was located in Alabama, was approximately 20 miles upstream of site 3; this river reach experienced considerably lower average discharge than the lower reach. This reach was straight (the result of channel straightening in the 1920's, Figure 1), less than 50 ft wide, with a nearly closed canopy consisting of oaks (*Quercus* spp.), maples (*Acer* spp.), sweetgum (*Liquidambar styraciflua*), and sycamore (*Platanus occidentalis*). River banks were 8-10 ft high and many trees along the bank were undercut by erosion.

15. Meanders had begun to form within the channelized reach at site 4. The riffle was less than 2 ft deep where samples were taken. There were no exposed gravel bars or emergent vegetation. The pool was located approximately 500 ft downstream of the riffle and had been created by woody snags.

Methods

16. Macroinvertebrates were collected in September, 1987, June and September 1988, and June and October, 1989. Sites 1-3 were sampled from the beginning of the survey through June 1989; site 4 was first sampled in June 1988 and the final sample was taken in October, 1989. Therefore, four consecutive samples were taken at each site; two in the spring and two in the fall. A decision was made by CESAM to add site 4 after the main sampling program had

begun. Counts of major taxa and species composition for each of the sampling periods are presented in Appendixes A-E.

17. At each site, 13 sediment samples were collected from each pool and each riffle. Ten samples were taken for macroinvertebrates, one for total organic content, and two (that were later combined) for grain size analysis. All samples were obtained with a hand-held coring device (Miller and Bingham 1987) that penetrated to a depth of 10 cm and sampled 0.0079 sq m. Organic content was determined by first drying the sample at 65° C, weighing, then heating in a muffle furnace to 550° C. The weight after firing at this latter temperature is termed "ash-free dry weight" and is the loss due to volatilization of organic material. Grain size was determined by sieving the sediments through a standard set of USGS sieves, and weighing each fraction. Sediment samples obtained for macroinvertebrates were preserved in the field with buffered 10-percent Formalin that was stained with rose bengal to facilitate removal of organisms.

18. In the laboratory benthic invertebrates were removed from sediments by an elutriation process. Sediment samples were agitated (swirled in a 3-gal bucket and poured through a 500-μ mesh sieve. Lighter material (detritus and invertebrates) was poured out of the bucket, sand and gravel remained on the screen, and fine silt passed through the screen. Each sample was elutriated five times; lighter material was combined and sand and gravel were discarded. Tests have indicated that this process retrieves 90-100 percent of the invertebrates on sand and gravel substrate.

19. Invertebrates were picked from the elutriated sample with the aid of a binocular microscope. Organisms were first sorted to major group (chironomids, oligochaetes, ephemeropterans, etc.) and counted. Following this initial analysis, chironomids, oligochaetes, and other invertebrates were identified to the lowest possible taxon with appropriate keys. Voucher specimens have been retained at the US Army Engineer Waterways Experiment Station (WES). A complete listing of invertebrates found at each sampling site appears in Appendix A.

PART III: RESULTS

Physicochemical Conditions

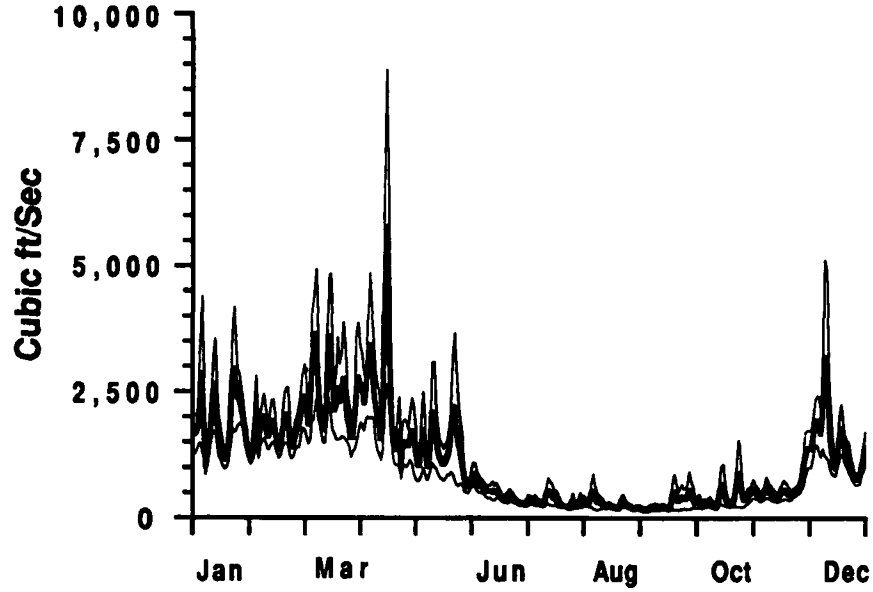
Discharge

20. The mean daily discharge for Luxapalila Creek at Columbus, MS (16 years of record; Tharpe et al. 1987) is 1,130 cfs but varies greatly from winter and spring maxima to summer and fall minima (Figure 2a). Mean daily discharge was usually greater than 1,000 cfs in winter and spring and often ranged up to 6,000 cfs. During the 16-year period of record the maximum daily discharge was 40,400 cfs on 14 April, 1979. Mean daily discharge was low (< 500 cfs and often 50 to 200 cfs) between June and August; the minimum discharge reported by Tharpe et al. 1987) occurred during the present study and was 20 cfs on 19 August, 1988.

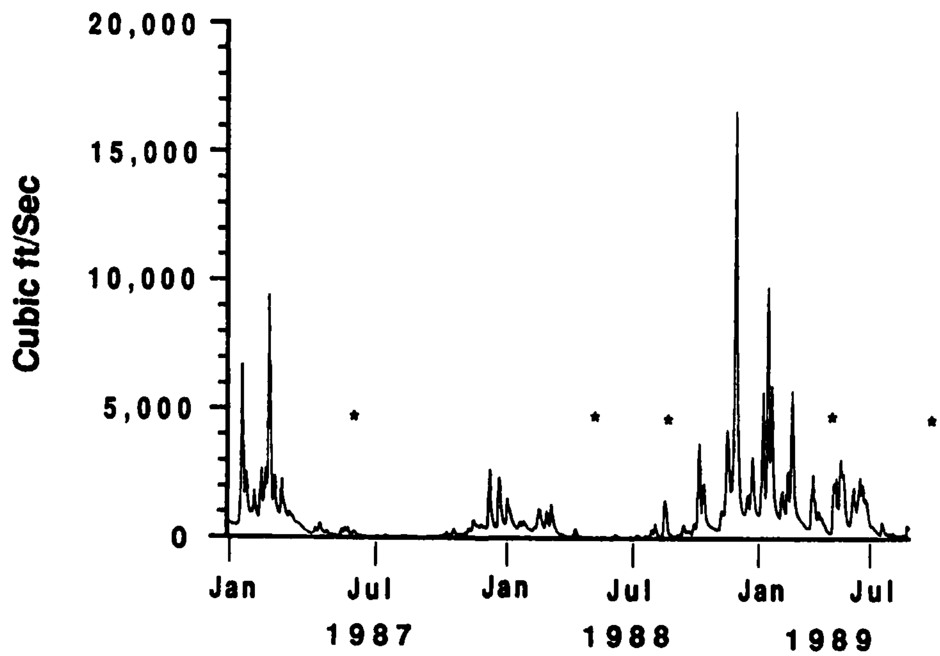
21. Mean daily discharge during the winter (1986-87) prior to this study was near average (Figure 2b). Winter and spring discharge in 1987-88 was low; values less than 1,000 cfs were typical and no values greater than 3,000 cfs occurred. In contrast, the winter and spring of 1988-89 were characterized by higher than average daily discharge; during this period a maximum value of nearly 17,000 cfs was recorded (i.e., approximately three times higher than the average maximum value; compare Figures 2a and 2b). The mean daily discharges for dates sampled during this survey are given below:

Sampling Date	Mean, cfs
16 September 1987	102
27 June 1988	40
28 June 1988	37
10 October 1988	216
11 October 1988	177
31 May 1989	239
1 June 1989	217
2 November 1989	194

22. The present study included samples affected by a wide range of hydrologic conditions. The samples collected in the fall of 1987 were taken during a low-water period after a winter and spring characterized by high water. Samples collected in 1988 were taken during a sustained drought after extremely low water during the previous winter and spring. The June 1989 samples were collected after high discharge that occurred during the winter and spring of 1988-89.



a. Average daily discharge ± standard error, 1974-88



b. Average daily discharge during the study period (sampling periods are noted with an asterisk)

Figure 2. Average daily discharge at Luxapalila Creek, Mississippi

Water chemistry

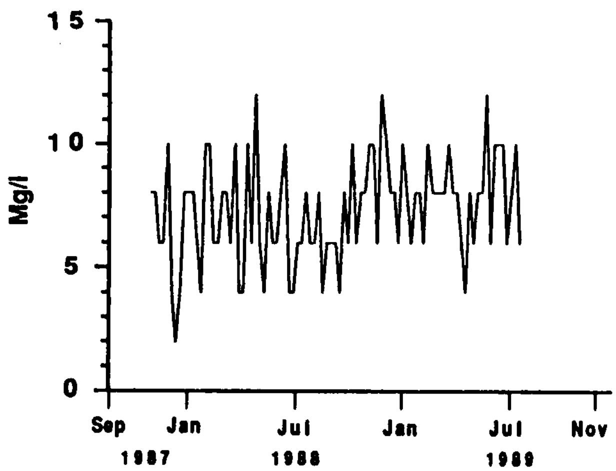
23. The water in Luxapalila Creek was moderately low in both calcium hardness (averaging 7 to 8 mg/ℓ) and alkalinity (averaging 7-10 mg/ℓ), was slightly acidic, and was clear to moderately turbid (Figures 3a-3d). Dissolved oxygen was high (6.6-8.2 mg/ℓ) and was always greater than 90-percent air saturation on dates when macroinvertebrate and sediment samples were taken. These aspects of water chemistry are related to land use and soil conditions in the basin. The low hardness and alkalinity reflect moderate to low deposits of limestone. Clear to moderate turbidity is a consequence of lack of heavily farmed agricultural land.

24. Community composition and density of benthic invertebrates are primarily affected by substrate composition and water velocity (Hynes 1970). It should be noted that lakes and rivers low in carbonates are generally not as productive (i.e., producing large amounts of biomass per unit of time) as hard-water habitats (Russell-Hunter 1970). Despite their generally lower productivity, soft-water habitats that are relatively unaffected by industrial, agricultural, or residential development (such as Luxapalila Creek) provide valuable habitat for a diverse fauna.

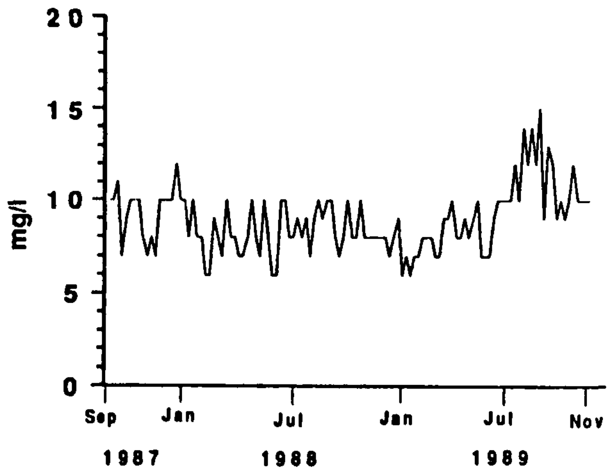
Sediment characteristics

25. The substrate of Luxapalila Creek can be characterized as poorly sorted gravel and coarse sand (Figures 4a and 4b). At all sites the silt-clay fraction (< 0.02 mm), and cobble fraction (< 100 mm) each constituted less than 5 percent of the total sediment weight. Median grain sizes for all samples ranged from 4.11 to 18.13 mm; sorting coefficients ranged from 0.90 to 2.72. Pools typically had slightly smaller median particle diameters than did riffles (7.79, ±2.32 (± standard deviation (SD)) versus 10.23 ±4.56, respectively). However, these differences are nonsignificant and should not obscure the fact that with respect to substrate characteristics pools and riffles in Luxapalila Creek are relatively similar. Differences between pools and riffles were affected by season. During the summer when discharge events capable of redistributing gravel became less frequent, differences between pools and riffles became even less apparent.

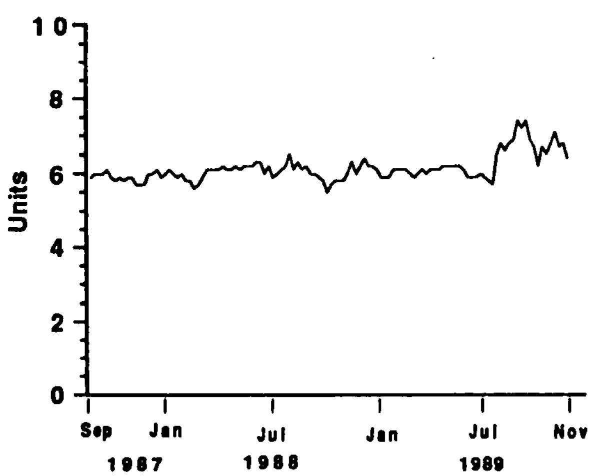
26. The average substrate organic content at all sites and habitat types was low and equaled 1.18 percent (± 0.89). There was no significant difference in percentage organic carbon between pools (1.05, ± 0.41) and riffles (1.31, ±1.19). In addition, there were no significant differences among stations (pools and riffles combined) for all dates. Average organic content



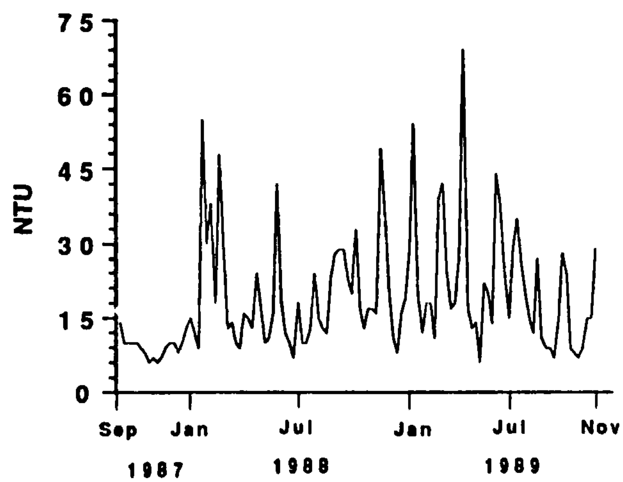
a. Calcium



b. Total alkalinity

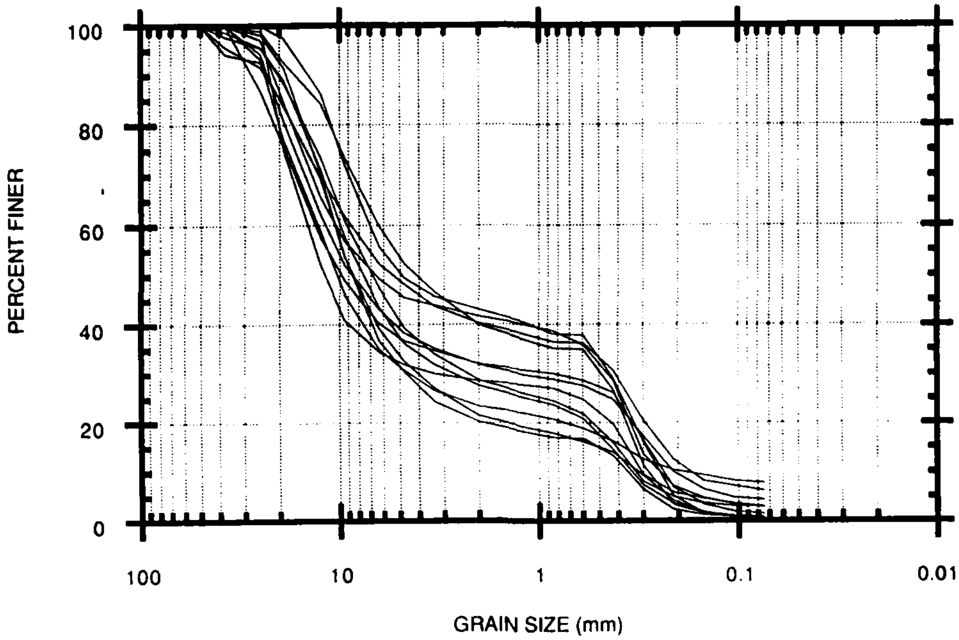


c. pH

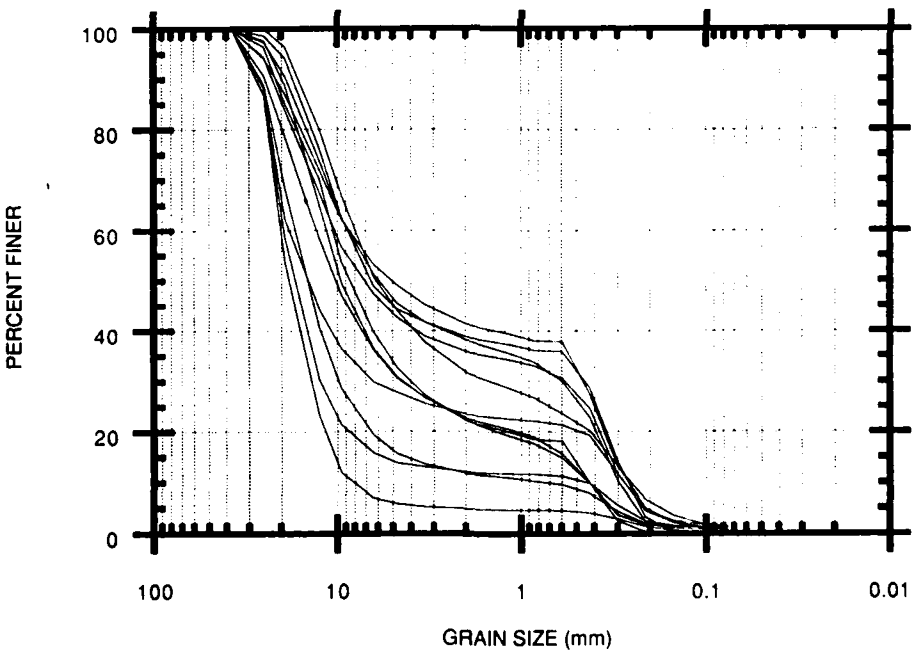


d. Turbidity

Figure 3. Five-day averages for selected water quality parameters at Columbus, Luxapalila Creek, Mississippi. Data courtesy of the Columbus Water Department



a. Pools



b. Riffles

Figure 4. Sediment characteristics in pools and riffles in Luxapalila Creek, Mississippi and Alabama during the study period

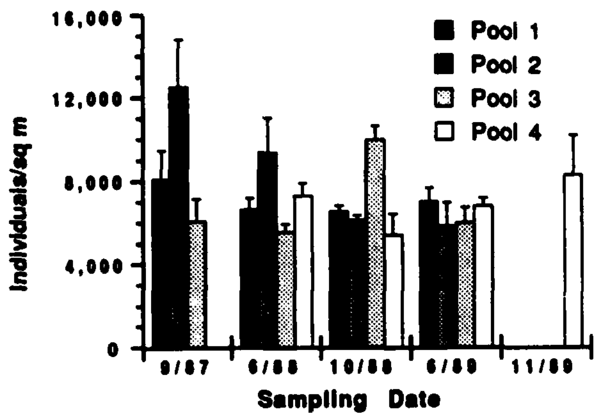
for all dates was 1.2 (± 0.63), 1.1 (± 0.47), 0.93, (± 0.33), and 0.88 (± 0.41) for sites 1, 2, 3, and 4, respectively. There was no significant difference in organic content with respect to season, although organic contents of sediments were slightly less during the spring (0.91, ± 0.45) than in the fall (1.5 ≤ (1.5, ±1.15).

Biological Conditions

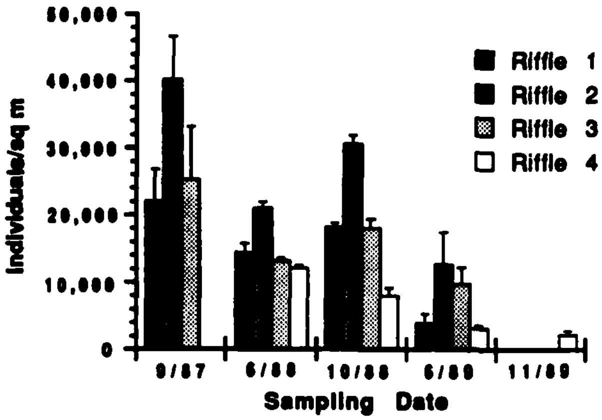
Macroinvertebrate density

27. The density of macroinvertebrates, averaged for all pools and dates, equaled 7,364 individuals per sq m. Variation in average macroinvertebrate density in pools was not great among sites or dates (Figure 5a). The lowest average density was observed at pool 4 in October 1988 and equaled 5,427 individuals per sq m; the highest average density of 12,561 individuals per sq m was observed at pool 2 in September 1987. Neither spatial nor seasonal density patterns were evident among sites and dates. The ratio of the total range of variation in average density (7,134 individuals per sq m) to the overall average density (7,364 individuals per sq m) equaled 1.0. This low value indicated lack of extreme variation in macroinvertebrate density data among pools and sampling dates.

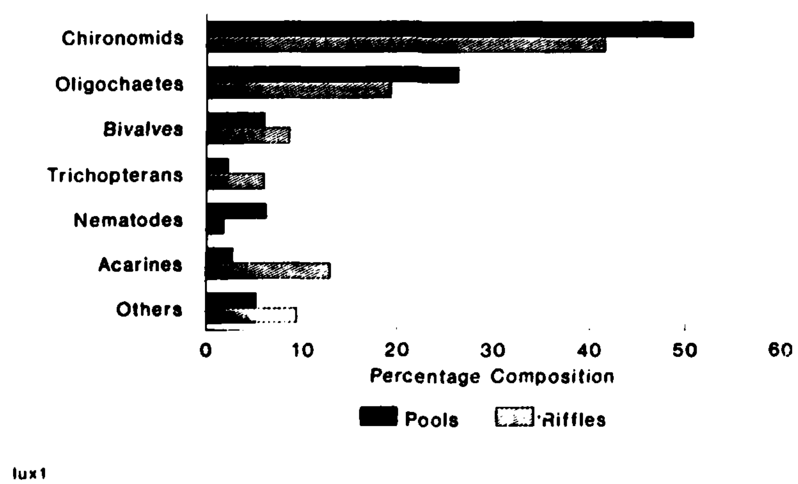
28. In contrast to pools, average macroinvertebrate density in riffles varied greatly among sites and dates (Figure 5b). Averaged for all sites and dates, macroinvertebrate density in riffles equaled 15,964 individuals per sq m and was slightly greater than twice the overall average density in pools. At sites 1, 2, and 3 (sampled from fall 1987 through spring 1989), average density appeared to follow a seasonal pattern. At each of these sites, the average density in spring was substantially less than in the preceding fall. At site 4, the average density of macroinvertebrates declined between spring 1988 and fall 1989; however, density at this site declined between October 1988 and June 1989 as was observed at the other three riffles. Site- and date-specific average densities in riffles varied from 2,184 (riffle 4, November 1989) to 40,276 (riffle 2, September 1987) individuals per sq m. The ratio of this range (38,092 individuals per sq m) to the overall average density (15,964 individuals per sq m) equaled 2.4, indicating greater than twice as much variation in total macroinvertebrates in riffles than in pools.



a. Density ($\bar{x} \pm$ SE) of all macroinvertebrates in pools



b. Density ($\bar{x} \pm$ SE) of all macroinvertebrates in riffles



c. Percentage composition of major macroinvertebrates in pools and riffles

Figure 5. Characteristics of macroinvertebrates in Luxapalila Creek, Mississippi and Alabama, 1987-89

29. A summary of mean macroinvertebrate density (and standard error, SE) by sampling date and habitat type, appears below:

	Pools		Riffles	
Date	Mean	SE	Mean	SE
Sep 87	8,587	4,426	28,820	20,469
Jun 88	7,229	2,421	15,248	3,985
Oct 88	7,025	2,221	18,730	8,553
Jun 89	6,433	1,701	9,662	12,614

The greater stability of biological conditions in pools than riffles is indicated by the more consistent mean and mean-to-SE ratio of macroinvertebrate density in the former habitat.

30. Analysis of variance of total macroinvertebrate density was performed for spring and fall 1988 and spring 1989 samples (i.e., those dates when all four pools and riffles were sampled). Significant variation in total macroinvertebrate density was evident among sites in both the spring and fall of 1988 (Table 1). Paired comparisons of sites confirmed the intersite patterns in Figures 5a and 5b; namely, density was higher in riffles than pools, intersite variation among riffles was high, and intersite variation among pools was low (Table 2). In both the spring and fall of 1988, 17 of 28 possible pairwise combinations between sites revealed significant differences. In the spring of 1988, 14 of these significant differences were for pool-versus-riffle comparisons, and all such comparisons indicated lower densities in pools than riffles. The remaining differences observed in spring involved inter-riffle comparisons, with densities at riffle 2 being significantly greater than densities at the other three riffles. In the fall, 12 of the 17 significant differences among sites involved riffle-versus-pool comparisons, and, as in the spring, riffles always had higher densities than did pools. The remaining five significantly different pair comparisons involved intersite differences among riffles. Riffle 4 had significantly lower macroinvertebrate density than all three other riffles, and riffle 2 had higher density than riffles 1 and 3. No significant intersite differences among pools were evident in either the spring or fall of 1988.

31. Lack of significant intersite differences (i.e., among pool, pool versus riffle, or among riffle) in total macroinvertebrate densities in the spring of 1989 (Table 1) was principally the result of the reduction in density in riffles during that sampling period (Figure 5b). These low densities in riffles in the spring of 1989 eliminated pool-versus-riffle differences

Table 1

Analysis of Variance of Total Macroinvertebrate Density at all Sites in Luxapalila Creek, Spring and Fall, 1988 and Spring, 1989

Date	Source	DF	Sum Squares	Mean Square	F	p
Spring 1988	Between sites	7	53,180	7,597	29.1	0.0001
	Within sites	32	8,346	261		
	Total	39	61,526			
Fall 1988	Between sites	7	167,338	23,905	89.0	0.0001
	Within sites	32	8,592	269		
	Total	39	175,930			
Spring 1989	Between sites	7	58,217	8,317	1.93	0.097*
	Within sites	32	137,881	4,309		
	Total	39	196,098			

* Not significant at the 0.05 level.

that were evident in 1988. Furthermore, within-riffle density in the spring of 1989 was high and obscured the between-riffle differences that were evident in the spring of 1989.

32. Chironomids and oligochaetes were the numerically dominant macroinvertebrates in both pools and riffles (Figure 5c). These two taxa comprised an average of 77 and 62 percent of all macroinvertebrates in Luxapalila Creek pools and riffles, respectively. *Corbicula fluminea*, trichopterans (caddisflies), acarines (mites), and nematodes (unsegmented worms) were less abundant than chironomids and oligochaetes but also comprised a substantial proportion of the total macroinvertebrate community. The bivalve community was dominated by the introduced Asiatic clam, *Corbicula fluminea*. Dominant trichopterans were *Hydroptila* and *Chimarra*. Bivalves, trichopterans, and acarines were more abundant in riffles than pools, but nematodes were more abundant in pools than riffles. *Corbicula*, *Hydroptila*, and *Chimarra* typically are found in lotic habitats. Neither acarines nor nematodes were identified to a lower taxonomic level.

33. The average density of chironomids, the dominant major taxon, was less variable in pools (Figure 6a) than in riffles (Figure 6b). Maximum density of this group was higher and minimum density was lower in riffles than pools. Averaged for all sites and dates, chironomid density in pools and riffles was 3,981 and 7,419 individuals per sq m, respectively. Site- and

Table 2

Paired Comparisons of Site-Specific Density of Total Macroinvertebrates in Luxapalila Creek, Spring and Fall 1988

		Spring 1988		Fall 1988	
		Mean Difference*	Scheffe's F-test	Mean Difference*	Scheffe's F-test
	P1 vs P2	-15.4	0.325	3.2	0.014
	P1 vs P3	8.4	0.097	-27.0	0.970
Interpool comparisons	P1 vs P4	-5.8	0.046	8.8	0.103
	P2 vs P3	23.8	0.776	-30.2	1.213
	P2 vs P4	9.6	0.126	5.6	0.042
	P3 vs P4	-14.2	0.276	35.8	1.705
	P1 vs R1	-62.0	5.264**	-92.0	11.258**
	P1 vs R2	-106.8	15.620**	-188.8	47.413**
	P1 vs R3	-51.2	3.590**	-90.4	10.870**
	P1 vs R4	-47.0	3.025**	-11.4	0.173
	P2 vs R1	-46.6	2.974**	-95.2	12.055**
	P2 vs R2	-91.4	11.440**	-192.0	49.034**
	P2 vs R3	-35.8	1.755	-93.6	11.653**
Pool-to-riffle comparisons	P2 vs R4	-31.6	1.367	-14.6	0.284
	P3 vs R1	-70.4	6.787**	-65.0	5.620**
	P3 vs R2	-115.2	18.174**	-161.8	34.822**
	P3 vs R3	-59.6	4.864**	-63.4	5.347**
	P3 vs R4	-55.4	4.203**	15.6	0.324
	P4 vs R1	-56.2	4.325**	-100.8	13.515*
	P4 vs R2	-101.0	13.969**	-197.6	51.936**
	P4 vs R3	-45.4	2.823	-99.2	13.089**
	P4 vs R4	-41.2	2.324**	-20.2	0.543
	R1 vs R2	-44.8	2.748**	-96.8	12.464**
	R1 vs R3	10.8	0.160	1.6	0.003
Inter-riffle comparisons	R1 vs R4	15.0	0.308	80.6	8.641**
	R2 vs R3	55.6	4.233**	98.4	12.879**
	R2 vs R4	59.8	4.897**	177.4	41.861**
	R3 vs R4	4.2	0.024	79.0	8.301**

* Negative values indicate lower mean density at first site listed for each paired comparison.

** Probability of F < 0.05.

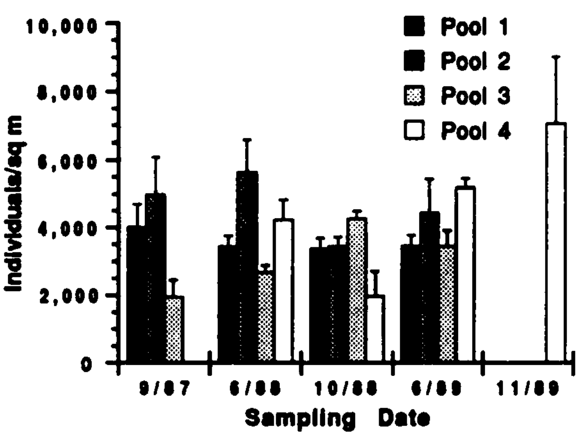
date-specific average density ranged from 1,953 to 7,036 individuals per sq m in pools and from 709 to 21,139 individuals per sq m in riffles. The ratios of these ranges to the overall average densities in pools and riffles were 1.3 and 2.9, respectively. In pools, variation of chironomid density did not follow a discernible intersite or seasonal pattern. In riffles, chironomid density was generally lowest in riffle 4 and highest in riffle 2. The seasonal pattern for total macroinvertebrates of lower density in spring than in the preceding fall was evident for chironomids in riffles 1 and 2. Riffle 1 was especially depauperate of chironomids in June 1989 compared to the three previous dates, and all four riffles had relatively low chironomid densities in June 1989.

34. The average density of oligochaetes was similar in pools and riffles and varied greatly among sites and dates (Figures 6c and 6d). Averaged for all sites and dates, the densities of oligochaetes in pools and riffles were 1,697 and 2,861 individuals per sq m, respectively. Site- and date-specific average densities of oligochaetes ranged from 178 to 3,620 and from 51 to 9,709 individuals per sq m in pools and riffles, respectively. Exceptionally low densities were observed during June 1989 (pools 2 and 4 and riffle 4) and in November 1989 in both the pool and riffle of site 4 (the only site samples in November 1989).

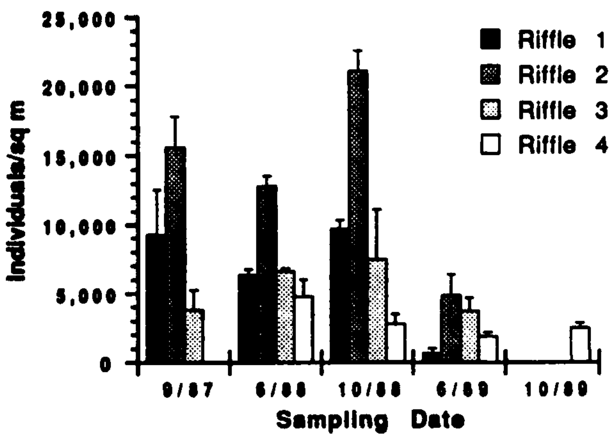
35. *Corbicula fluminea*, which was moderately abundant in riffles, had especially low densities at all riffles in June 1989 (Figure 7). Less than 500 individuals per sq m were found at riffle 1 in the spring of 1989, although densities of this clam had averaged 2,000 individuals per sq m during 1988. In riffles 2 and 3, 1988 densities of *C. fluminea* averaged 1,000 and 2,750 individuals per sq m, respectively, but no Asiatic clams were collected from these two riffles in June 1989. No *C. fluminea* were found in riffle 4 in June 1989, although high density populations were never noted at this site.

<u>Community composition</u>

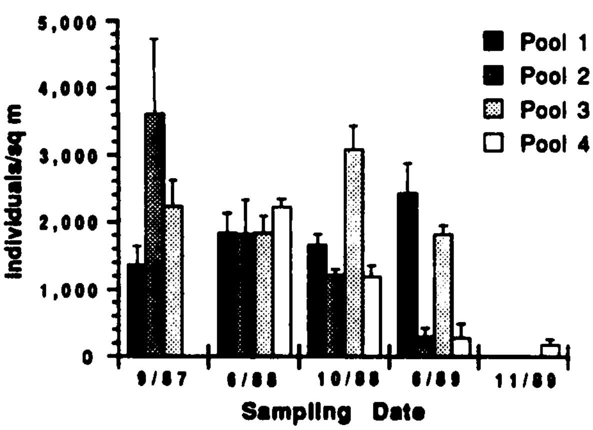
36. In Luxapalila Creek the abundant chironomid and oligochaete communities were rich in species. In both pools and riffles, cumulative species of chironomids and oligochaetes was a linear function of the cumulative number of individuals (Figures 8a and 8b). The rate of acquisition of new species was clearly higher in pools than riffles. In pools, 63 species of chironomids were represented among 1,503 individuals identified to the species level. In riffles, 50 species of chironomids were represented among 1,910 individuals.



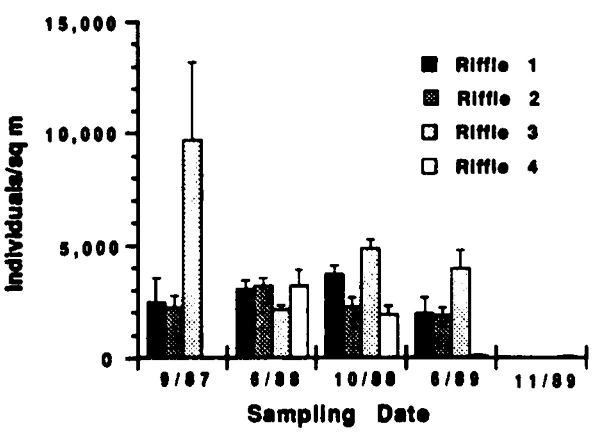
a. Chironomids in pools



b. Chironomids in riffles



c. Oligochaetes in pools



d. Oligochaetes in riffles

Figure 6. Total density of chironomids and oligochaetes in pools and riffles, Luxapalila Creek, Mississippi and Alabama, 1987-89

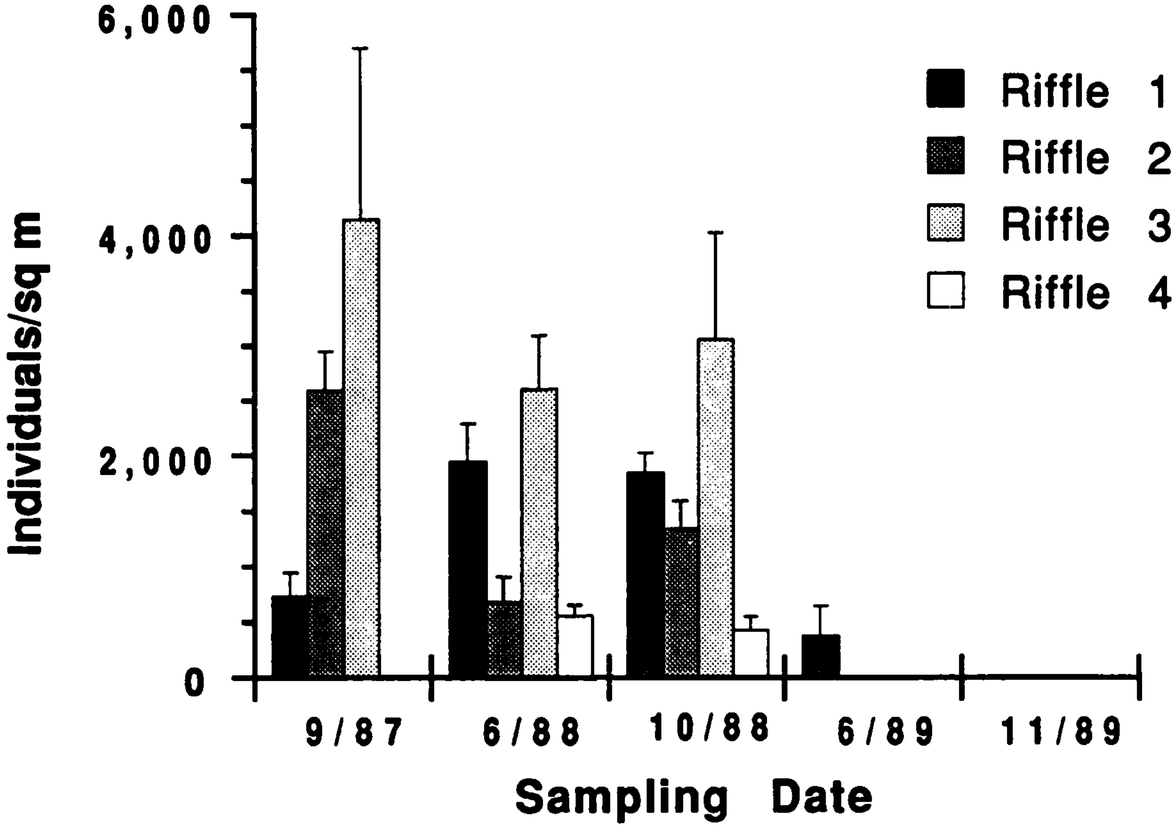
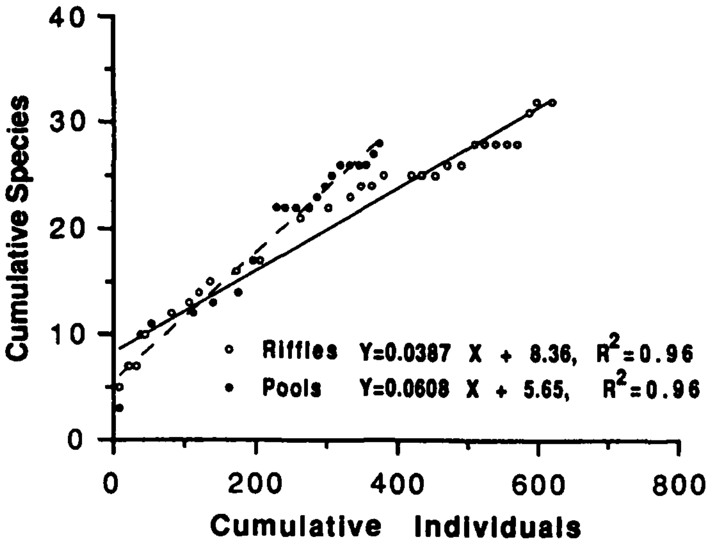
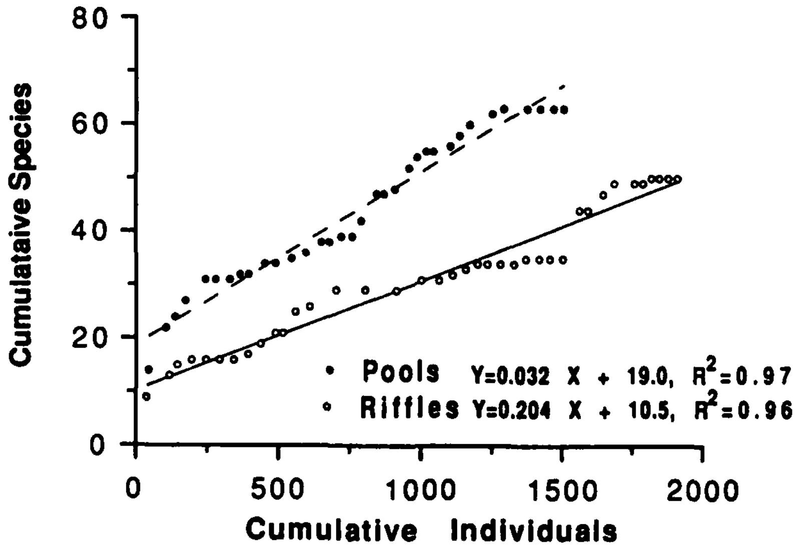


Figure 7. Total density of *Corbicula fluminea* in riffles in Luxapalila Creek, Mississippi and Alabama, 1987-89

37. The distribution of individuals among species of both chironomids and oligochaetes was highly equitable (i.e., evenly distributed) based on Simpson's index of equitability (Simpson 1949), and equitability was slightly higher in pools than riffles (Tables 3 and 4 for chironomids and oligochaetes, respectively). The value of this index equals one minus the sum of the proportional abundance of each species in a community. The index is relatively insensitive to underestimation of species richness and ranges from theoretical minima and maxima approaching 0.0 and 1.0, respectively. Values between 0.2 and 0.8 are observed in most samples of naturally occurring communities (e.g., Whittaker 1965). Simpson's index of equitability was slightly less than 1.0 for both taxonomic groups in both habitats (Tables 3 and 4 for chironomids and oligochaetes, respectively). The theoretical maximum equitability of chironomids in pools would have been observed if there was equal distribution of the 1,503 individuals among all 63 species identified from pool samples (Simpson's



a. Naidids and tubificids



b. Chironomids

Figure 8. Species richness as a function of cumulative individuals for oligochaetes and chironomids, Luxapalila Creek, Mississippi and Alabama, 1987-89

Table 3

Distribution of Individuals Among Species of Chironomids in Luxapalila Creek, Mississippi*

Species	Pools p	Pools n	Riffles p	Riffles n
Chironomidae				
Chironominae				
Chironomini				
Chironomus sp.	0.0160	24	0.0005	1
Cladopelma sp.	0.0013	2	0.0000	0
Cryptochironomus fulvus	0.0213	32	0.0011	2
Cryptochironomus sp.	0.0027	4	0.0011	2
Dicrotendipes neomodestus	0.0140	21	0.0661	124
Dicrotendipes nervosus Type I	0.0319	48	0.0016	3
Dicrotendipes nervosus Type II	0.0013	2	0.0000	0
Dicrotendipes sp. I	0.0120	18	0.0080	15
Endochironomus sp.	0.0093	14	0.0005	1
Glyptotendipes sp.	0.0033	5	0.0005	1
Harnischia sp.	0.0040	6	0.0005	1
Microtendipes sp.	0.0007	1	0.0000	0
Nilothauma babiyi	0.0106	16	0.0016	3
Parachironomus abortivus	0.0020	3	0.0005	1
Paracladopelma undine	0.1240	186	0.0016	3
Paralauterborniella nigrohalteralis	0.0313	47	0.0016	3
Paratendipes albimanus	0.0013	2	0.0000	0
Paratendipes nudisquama	0.0007	1	0.0000	0
Phaenopsectra dyari	0.0838	126	0.0000	0
Phaenopsectra flavipes	0.0186	28	0.0000	0
Polypedilum convictum	0.0067	10	0.0762	143
Polypedilum fallax	0.0013	2	0.0000	0
Polypedilum illinoense	0.0126	19	0.0053	10
Polypedilum nr. *scaloneum*	0.1190	179	0.0410	77
Pseudochironomus sp.	0.0146	22	0.0016	3
Robackia sp.	0.0033	5	0.0624	117
Stenochironomus sp.	0.0007	1	0.0000	0
Stictochironomus sp.	0.0020	3	0.0005	1
Tribelos sp.	0.0000	0	0.0005	1
Xenochironomus sp.	0.0053	8	0.0213	40
Unidentified chironomini		4		5
Tanytarsini				
Cladotanytarsus sp.	0.0146	22	0.0320	10
Lauterborniella sp.	0.0013	2	0.0000	0
Micropsectra sp.	0.0033	5	0.0000	0
Rheotanytarsus sp.	0.0140	21	0.0736	138
Stempellina sp.	0.0013	2	0.0000	0

(Continued)

* Note: p = relative abundance; n = number present.

Table 3 (Concluded)

Species	Pools p	Pools n	Riffles p	Riffles n
Stempellinella sp.	0.0020	3	0.0000	0
Tanytarsus coffmani	0.0000	0	0.0016	3
Tanytarsus glabrescens	0.0319	48	0.0474	89
Tanytarsus querlus	0.1530	230	0.0245	46
Unidentified tanytarsini		0		4
Orthocladiinae				
Brillia sp.	0.0007	1	0.0000	0
Coryoneura celeripes	0.0013	2	0.0144	27
Coryoneura taris	0.0013	2	0.0197	37
Coryoneura sp.	0.0007	1	0.0016	3
Cricotopus bicinctus	0.0120	18	0.0938	176
Cricotopus trifascia	0.0000	0	0.0011	2
Cricotopus sp.	0.0013	2	0.0016	3
Eukiefferiella sp.	0.0027	4	0.0032	6
Nanocladius crassicornus	0.0027	4	0.0037	7
Nanocladius distinctus	0.0027	4	0.0059	11
Nanocladius rectinervis	0.0000	0	0.0027	5
Nanocladius minimus	0.0013	2	0.0000	0
Nanocladius sp.	0.0067	10	0.0006	1
Parakiefferiella sp.	0.0619	93	0.0448	84
Rheocricotopus sp.	0.0000	0	0.0053	10
Thienemanniella nr. *fusca*	0.0047	7	0.2569	482
Thienemanniella xena	0.0007	1	0.0219	41
Unidentified orthocladiinae		5		15
Tanypodinae				
Ablabesymia mallochi	0.0033	5	0.0011	2
Ablabesymia parajanta	0.0446	67	0.0139	26
Ablabesymia tarella	0.0020	3	0.0016	3
Clinotanypus sp.	0.0007	1	0.0000	0
Labrundinia pilosella	0.0007	1	0.0059	11
Macropelopia sp.	0.0013	2	0.0005	1
Natarsia sp.	0.0013	2	0.0005	1
Nilotanypus sp.	0.0007	1	0.0219	41
Pentaneura sp.	0.0067	10	0.0000	0
Procladius sp.	0.0599	90	0.0021	4
Thienemannimyia sp.	0.0013	2	0.0005	1
Unidentified tanypodinae		34		10
Diamesinae				
Potthasia sp.	0.0007	1	0.0000	0
Unidentified Chironomidae		67		85
Total number of species		63		85
Total number of individuals identified		1,504		1,876
Simpson's index of equitability		0.93		0.90

Table 4

Distribution of Individuals Among Species of Naidid and Tubificid Oligochaetes in Pool Versus Riffles in Luxapalila Creek, Mississippi*

Taxon	Pools n	Pools p	Riffles n	Riffles p
Naididae				
Amphichaeta leydigi	6	0.0160	1	0.0016
Bratislavia bilongata	0	0.0000	2	0.0033
Bratislavia unidenta	0	0.0000	4	0.0065
Chaetogaster diaphanus	3	0.0080	51	0.0831
Dero digitata	3	0.0080	10	0.0163
Dero furcata	13	0.0347	0	0.0000
Dero nivea	8	0.0213	78	0.1270
Dero obtusa	11	0.0293	76	0.1238
Dero trifida	3	0.0080	9	0.0147
Dero sp.	5	0.0133	3	0.0049
Homochaeta naidina	1	0.0027	0	0.0000
Nais behningi	0	0.0000	3	0.0049
Nais bretscheri	0	0.0000	3	0.0049
Nais communis	0	0.0000	3	0.0049
Nais elinquis	1	0.0027	0	0.0000
Nais pardalis	12	0.0320	90	0.1466
Nais pseudobtusa	0	0.0000	10	0.0163
Nais simplex	0	0.0000	3	0.0049
Nais variablis	2	0.0053	53	0.0863
Piquetiella michiganensis	5	0.0133	29	0.0472
Pristina aquiseta	4	0.0107	28	0.0456
Pristina leidyi	6	0.0160	33	0.0537
Pristina synclites	29	0.0773	1	0.0016
Pristina sp.	0	0.0000	1	0.0016
Pristinella jenkinae	2	0.0053	1	0.0016
Pristinella longidentata	3	0.0080	2	0.0033
Pristinella longisoma	0	0.0000	9	0.0147
Pristinella osborni	8	0.0213	52	0.0847
Pristinella sima	0	0.0000	2	0.0033
Slavina appendiculata	2	0.0053	21	0.0342
Specaria josinae	52	0.1387	1	0.0016
Stevensoniana trivandrama	1	0.0027	26	0.0423
Total identified naidids	180	0.4800	602	0.9805
Total unidentified naidids	0		8	
Total naidids	180		610	
Tubificidae				
Aulodrilus limnobius	19	0.0507	0	0.0000
Aulodrilus piqueti	127	0.3387	4	0.0065

(Continued)

* Note: n = number present; p = relative abundance.

Table 4 (Concluded)

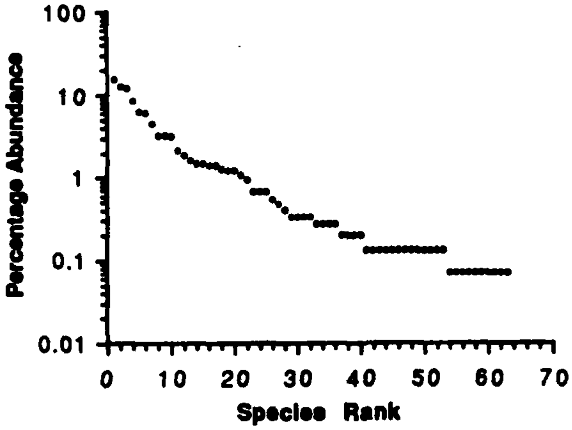
Taxon	Pools n	Pools p	Riffles n	Riffles p
Aulodrilus pluriseta	6	0.0160	0	0.0000
Branchiura sowerby	31	0.0827	7	0.0114
Limnodrilus hoffmestri	11	0.0293	0	0.0000
Limnodrilus rubripenis	0	0.0000	1	0.0016
Total identified tubificids	195	0.5200	12	0.0195
Total unidentified tubificids	78		28	
Total tubificids	275		40	
Tubificid-to-Naidid Ratio	1.53		0.07	
Simpson's Index of Equitability	0.84		0.91	

index value equal to 0.98). In contrast, the most inequitable possible distribution would have been observed if there was a single individual of each of 62 species and 1,441 individuals of one extremely dominant species (Simpson's index equal to 0.08). The observed value of 0.92 is near the theoretical maximum of 0.98. Similarly high values were observed for chironomids in riffles and oligochaetes in both pools and riffles.

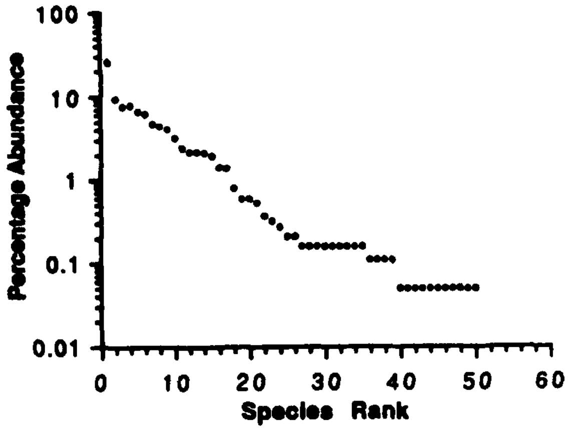
38. The unusually high equitability of chironomids and oligochaetes in pools and riffles was especially evident in plots of species-specific percentage abundance as a function of species rank (Figures 9a-9d). It is not unusual for the two or three most abundant species in a community of benthic macroinvertebrates to comprise 75-90 percent of the entire community. In Luxapalila Creek, no individual species comprised greater than 30 percent and the three most abundant species represented approximately 50 percent of the total community. Species relative abundance in these highly equitable communities spanned only 2.0 to 2.5 orders of magnitude in each community sample, although total species richness was high, ranging from 27-63.

39. Distinct differences were apparent in the most abundant species of chironomids in pools versus riffles, although at least a few individuals of most species could be found in either habitat type (Table 3). None of the six most abundant species in pools were among the six most abundant species in riffles. The six dominant chironomids in pools were *Tanytarsus querlus* (15.3 percent), *Paracladopelma undine* (12.4 percent), *Polypedilum* nr. *scalaenum* (11 percent) *Phaenopsectra dyari* (8.4 percent), *Parakiefferiella* sp. (6.2 percent), and *Procladius* (6.0 percent). All but one of these species (*P. dyari*) were obtained in riffles as well as pools, although both *P. undine* and *Procladius* sp. were very uncommon in riffles. *Tanytarsus querlus*, *P.* nr. *scalaenum*, and *Parakiefferiella* sp. were moderately abundant in riffles; these species comprised 2.5, 4.1, and 4.5 percent, respectively, of the chironomids in riffles. Considered in total, the six most abundant species in pools comprised 60.2 percent of the pool assemblage of chironomids, versus 11.5 percent of the riffle assemblage of chironomids.

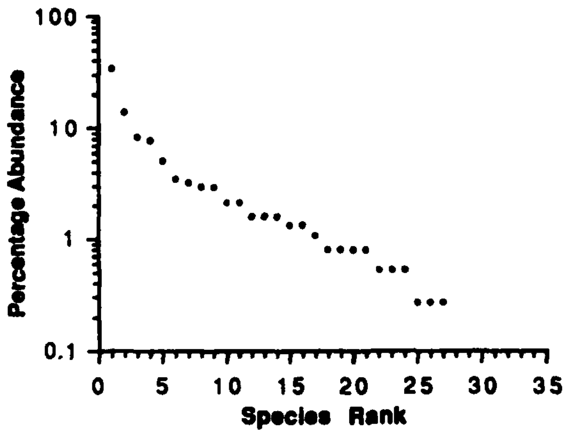
40. The six most abundant species of chironomids in riffles were *Thienemanniella* nr. *fusca* (25.7 percent), *Cricotopus bicinctus* (9.4 percent), *Polypedilum convictum* (7.6 percent), *Rheotanytarsus* sp. (7.4 percent), *Dicrotendipes neomodestus* (6.6 percent), and *Robackia* sp. (6.2 percent). The combined abundance of these six species in riffles and pools was 62.9 and 6.3 percent, respectively. None of the dominant species in riffles was found



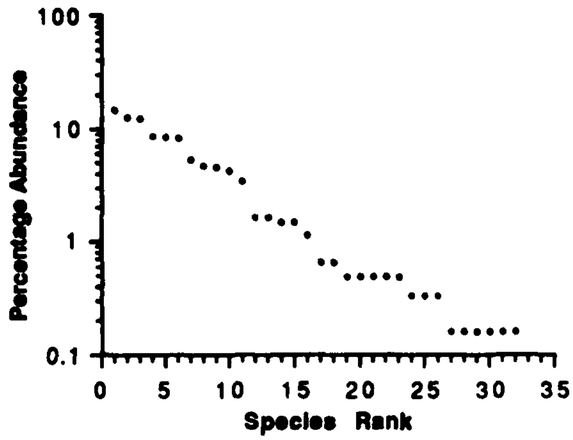
a. Chironomids in pools



b. Chironomids in riffles



c. Naidids and tubificids in pools



d. Naidids and tubificids in riffles

Figure 9. Species relative abundance in relation to dominance for chironomids and oligochaetes in pools and riffles, Luxapalila Creek, Mississippi and Alabama, 1987-89

in greater than 1.6 percent abundance among pool-dwelling chironomids, although some individuals of all six species were obtained from the more lentic habitat.

41. Differences were also evident between pool and riffle chironomid communities among uncommon species. Eighteen uncommon species of chironomids were found in pools but not in riffles, but only four such species were found only in the riffles (Table 3). Community structure in terms of uncommon species must be evaluated cautiously, because a high degree of uncertainty is associated with presence or absence data for uncommon species. Nonetheless, the magnitude of pool-versus-riffle difference in the number of species unique to each habitat type (i.e., a ratio of 18 to 4) indicates that more species of this group probably occurred in pools than in riffles. Drift of chironomid larvae is a major means of dispersal in rivers and streams (Simpson and Bode 1980). Settlement of drifting larvae in pools is probably more likely than in riffles given the more depositional nature of the former habitat. Thus regardless of the origin of drifting chironomids, successful immigration via drift into pools is probably higher than into riffles and may account for the slightly greater richness observed in pools versus riffles.

42. As with chironomids, the pool community of oligochaetes was dominated by different species than the riffle community (Table 4). The six most abundant species in pools included three tubificids (*Aulodrilus piqueti* (33.9 percent), *Branchiura sowerbyi* (8.3 percent), and *A. limnobius* (3.5 percent)) and three naidids (*Specaria josinae* (13.9 percent), *Pristina synclites* (7.7 percent), and *Dero furcata* (3.5 percent)). Two of these species (*A. limnobius* and *D. furcata*) were not obtained in riffles, and the other four dominant species in pools were uncommon in riffles. The combined abundance of these six species was 72.4 percent in pools and only 2.2 percent in riffles. The six most abundant species in riffles were all naidids, and included *Nais pardalis* (14.7 percent), *Dero nivea* (12.7 percent), *D. obtusa* (12.4 percent), *N. variables* (8.6 percent), *Pristinella osborni* (8.5 percent), and *Chaetogaster diaphanus* (8.3 percent). All six of these species were also obtained from pools, four occurred in pools in moderate abundance (2.0 percent), but none individually comprised more than 3.2 percent of the oligochaete community in the more lentic habitat type. The combined abundance of these six species was 65.2 percent in riffles and 11.6 percent in pools.

43. As reflected in the species composition of dominant oligochaetes in pools and riffles, the pool community was a mixed assemblage of tubificids and

naidids, but the riffle community was almost entirely comprised of naidids (Table 4). Tubificids are lentic species, collected frequently in ponds and lakes, whereas naidids are found in riffles. The ratio of tubificids to naidids equaled 1.52 and 0.07 in pools and riffles, respectively. Among uncommon species, this inter-habitat difference was also notable. Ten species of naidids were obtained from riffles but not pools, whereas three species of naidids were found in pools but not riffles. Three species of tubificids were found in pools but not riffles, and only one species of tubificid (*Limnodrilus rubripenis*) was found only in riffles.

44. The particular combination of species occurring at a given site (especially on a particular date) was generally consistent with, but not identical to, the pool or riffle communities indicated by the composite data summarized in Table 5. Intersite comparisons of chironomid and oligochaete species composition were made using Jaccard's similarity index of beta diversity. Beta diversity is essentially a measure of how different sites are in terms of the variety of species found in them (Magurran 1988). Jaccard's index of beta diversity is equal to $j/(a+b-j)$; where $\underline{a}$ and $\underline{b}$ equal the number of species in sites $\underline{a}$ and $\underline{b}$, respectively, and $\underline{j}$ equals the number of species found in both sites. Intersite similarity was low, as exemplified by comparisons among sites in the fall of 1987 (Table 5). The highest observed value was only 0.65 for chironomids at the site 2 riffle versus the site 3. These results indicate that species composition varies among pools and riffles, although the degree of dissimilarity is probably overestimated due to the low abundance of most species (Figures 9a-9d) and the uncertainty of even the presence or absence of such species based on anything less than extremely extensive sampling.

45. Community composition at the species level also varied greatly among sampling dates. For example, although *Nais pardalis* was the most abundant oligochaete in riffles based on all data combined, this species did not occur in the fall 1988, the spring 1989, or the fall 1989 samples.

46. Only by combining data for all pools and all riffles for all sampling dates are characteristic interhabitat differences evident (Table 5). For example, rheophilic (flow-loving) chironomids that dominated the combined data set for riffles (*Thienemanniella* nr. *fusca*, *Cricotopus bicinctus*, *Polypedilum convictum*, and *Rheotanytarsus* sp. as shown in Table 3 did not occur in the same relative abundance on each riffle on a particular date or in similar abundance in a particular riffle on different dates. In addition, although

Table 5

Community Comparisons (Jaccard's Index) for Chironomids and Oligochaetes in Luxapalila Creek, Mississippi, 1987-89

Taxonomic Group	Habitat	Comparison Between Sites 1 vs 2	2 vs 3	1 vs 3
Chironomidae	Pool	0.55	0.63	0.41
	Riffle	0.59	0.65	0.61
Oligochaeta	Pool	0.31	0.23	0.43
	Riffle	0.35	0.35	0.36

naidids generally dominated the oligochaete community in riffles, species composition of this group exhibited great variation among sites and dates. In general, dynamic changes in species composition even among dominants were generally so great that they masked seasonal patterns of density change that were evident at the family level of description.

47. In June 1988, 20 specimens of the oligochaete *Piquetiella michiganensis* were found in four of five samples of the riffle at site 4. Densities were estimated at 314.3 (± 258.2) individuals/sq m. In a nearby pool two of five core samples yielded one specimen each with an estimated density of 31.4 (± 38.5) individuals per sq m. Similar sampling at two pools and two riffles in Luxapalila Creek near its confluence with the Tombigbee River yielded no *P. michiganensis*. In the fall of 1988, a single *P. michiganensis* was collected in a riffle in the upper section of the lower reach.

48. This species has been reported in north central North America as far south as Virginia (Brinkhurst 1986). It has been collected in the Great Lakes and upper Mississippi River east to the Susquehanna and Chemung Rivers in New York (Hiltunen and Klemm 1980; Klemm 1985), and south to the Wabash River in southern Indiana.* More complete macroinvertebrate surveys in the central United States would establish whether the apparent disjunct distribution of this species is the result of incomplete data or specific habitat requirements that are occasionally met at the periphery of its range.

* Personal Communication, Feb 1989, Dr. Michael S. Loden, Jefferson Parish Environmental Department, Jefferson, LA.

PART IV: DISCUSSION

Major Findings

49. In this macroinvertebrate study in Luxapalila Creek, samples were taken after exceptionally high (June and November 1989) and low (June and September 1988) water. Floods and droughts are physical factors of potentially major significance to the structure and abundance of stream invertebrate communities. Intersite and interdate variability in community structure were probably intensified by the extreme range of physical conditions that occurred during this study. This factor was mainly responsible for the high biological diversity in Luxapalila Creek. In addition, the high equitability of species within chironomid and oligochaete communities reflected effects of a wide range of extreme physical conditions that occurred between September 1987 and November 1989.

50. Especially low densities of chironomids, oligochaetes, and total invertebrates were prominent characteristics of Luxapalila Creek in June 1989, although each site did not exhibit reduced density of all three groups. It is noteworthy that the highest mean daily discharge (14,000 cfs) recorded during the course of this study occurred in January 1989. The prominence of especially low densities in June 1989 is evidence that scouring floods affected standing crops (although to different degrees for particular taxa at particular sites). By November 1989, oligochaetes at site 4 (the only site sampled in the fall of 1989) had not recovered in the pool or riffle, but chironomids in pool 4 were at the highest average density observed for this group of invertebrates in Luxapalila Creek pools (Figure 6a). Midges are notable for their ability to rapidly recolonize after decimation, with their aerial adult stage and the aquatic drift of larvae contributing to this opportunistic characteristic (e.g., Simpson and Bode 1980). Oligochaetes are of course fully aquatic; naidids can enter the drift although tubificids rarely do (Milbrink 1973). During early biological colonization of a manmade gravel bar in the Tennessee-Tombigbee Waterway, chironomids were among the first colonists while oligochaetes appeared later (Bingham and Miller 1989).

51. In addition to scouring high flows during the winter and spring of 1989, this study included a period of sustained and exceptionally low water during the summer and fall of 1988. The lowest recorded discharge (25 cfs) in the 16-year history of records was measured during the summer of 1988. The

abundance of *Paracladopelma undine*, a dominant chironomid in pools, declined greatly in the fall of 1988, from initially high densities in the fall of 1987 and spring of 1988. *Paracladopelma undine* is a member of a genus that is apparently restricted to cool water (Wierderholm 1983). It is possible that the decline of this species in the fall of 1988 may have been related to physical stress (such as reduced dissolved oxygen and increased water temperature) associated with extremely low stream discharge for a sustained period. Similarly, it is noteworthy that the highest measured ratio (5.0) of tubificid to naidid oligochaetes on any date was measured for the October 1988 pool samples. Tubificids are recognized to be tolerant of pool water quality, including low dissolved oxygen and high temperature (Brinkhurst and Cook 1974).

52. Ordinarily, cumulative species is a linear function of the *logarithm* of the cumulative number of individuals (e.g., McNaughton and Wolf 1973). The lack of a semilogarithmic relationship between cumulative species and cumulative individuals (Figure 8) during this study was primarily because even more species of chironomids and oligochaetes are likely to occur in Luxapalila Creek than were identified. Nonetheless, the extreme physical conditions of both low and high flow allowed more species per individuals identified to be accounted for than if more stable discharge conditions had prevailed.

53. The slopes of dominance-diversity plots of chironomid and oligochaete communities (Figures 9a-9d) were extraordinarily low and indicate the high equitability of species in Luxapalila Creek. Percentage abundance of species changed only two orders of magnitude in community samples of 27-63 species. Generally, a range in species abundance of 3 to 5 orders of magnitude would be associated with rich assemblages of species (McNaughton and Wolf 1973; Whittaker 1965). In comparison, species abundances of 15-30 species in samples of riverine mussel communities typically span the same range as that observed among 27-63 species of chironomids or oligochaetes in Luxapalila Creek. The high equitability among species of chironomids and oligochaetes in Luxapalila Creek pools and riffles observed during the present study may have been enhanced by the extreme range of hydraulic conditions.

Recommendations

54. Choice of sites within the project area for a post-construction macroinvertebrate study should include at least one pool-riffle sequence not directly affected and one pool-riffle sequence directly affected by the project. Pools directly affected by construction may become more depositional in nature than pools not directly affected by construction. Thus, pool-versus-riffle comparisons at locations directly affected by the project may show clearer differences in macroinvertebrate community structure than pool-versus-riffle comparisons at locations not directly affected by the project. As in the present study, characterizations of the macroinvertebrate community should focus on density and species relative abundance. Macroinvertebrates should be studied at the pool and riffles of site 4, because this site is upstream of the project area and is not likely to show direct or indirect effects of project construction.

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APPENDIX A

COUNTS OF MAJOR TAXA PER CORE SAMPLE, FALL 1987

Luxapalila Creek, Mississippi																	
Sampling Date: 9/16/87																	
LX987C																	
Counts of major taxa: raw data																	
(for those samples identified to species, counts are summed here, all others (*) are raw data)																	
[illegible]	[illegible]	[illegible]	P\1\8	P\1\9	P\1\10	P\2\5	P\2\6	P\2\8	P\2\9	P\2\10	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Turbellaria	0	0	0	0	0	0	1	0	0	0	0	1	0	0	1	0	0
Oligochaeta	14	9	7	18	6	14	59	31	8	31	8	14	16	11	27	30	18
Chironomidae	46	22	40	34	17	21	22	58	35	61	12	31	23	9	24	8	1
Ceratopogonid	0	0	6	2	3	0	0	5	1	3	0	0	1	0	2	0	3
Coleoptera		0	0	1	0	0	1	0	0	2	0	0	2	0	0	1	0
Ephemeroptera	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Odonata	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Plecoptera	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Trichoptera	1	0	0	0	0	0	2	1	0	2	0	0	0	0	0	0	0
Amphipoda	1	0	1	0	0	0	0	0	0	0		0	0	0	0	0	0
Isopoda	0	3	0	0	0	0	0	0	0	0		0	0	0	0	0	0
Bivalvia	2	5	1	1	0	13	10	28	17	21		2	3	0	1	0	1
Gastropoda	2	0	0	0	0	1	0	0	1	1	0	0	0	6	0	0	1
MINOR GROUPS																	
Acarina	5	0	7	0	1	2	1	11	0	1		0	0	2	7	2	0
Polychaeta	0	0	0	0	0	0	0	1	0	0	0	0		0	0	0	0
Hirudinea	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	1
Empididae	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0
Collembola	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Nematoda	20	8	17	10	3	2	2	8	4	9	3	1	19	10	0	4	3
Nemertea	0	0	0	3	0	0	0	0	0	0	0	0	0	0	24	0	0
Aeolosomatidae	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0
TOTAL	92	48	79	69	30	53	98	145	66	131	23	50	64	58	87	45	28

Luxapalila Creek, Mississippi
Sampling Date: 9/16/87
Raw species data: LX987RAW

TAXA	GENUS SPECIES	SITE P\1\3	P\1\7	P\1\8	P\1\9	P\1\10	P\2\3	P\2\6	P\2\8	P\2\9	P\2\10
PLATYHELMINTHES											
TURBELLARIA											
	Dugesia tigrina										
	Planaria sp.							1			
	Unidentified										
ANNELIDA											
POLYCHAETA									1		
OLIGOCHAETA											
	Sparganophilus										
	Haplotaxidae		1								
	Lumbriculidae	4	2								
	Naididae										
	Amphichaeta leydigi		1						1		1
	Bratislavia bilongata										
	Bratislavia unindentata										
	Chaetogaster diaphanus								1	1	
	Dero digitata										
	Dero furcata										
	Dero nivea				1						
	Dero obtusa										
	Dero trifida		1								
	Nais behningi										
	Nais bretscheri										
	Nais communis										
	Nais pardalis	1			1						
	Nais pseudobtusa										
	Nais variablis										
	Pristina equiseta										
	Pristina leidyi		1		1						
	Pristina synclites						3	20			3
	Pristinella jenkinae				1						
	Pristinella longidentata							2	1		1
	Pristinella longisoma										
	Pristinella osborni										
	Pristinella sima										
	Slavina appendiculata										
	Specaria josinae		1				2	4	7	5	4
	Stevensoniana trivandrama										
	Unidentified naididae										
	Tubificidae										
	Aulodrilus limnobius	1	1	2					4	1	2
	Aulodrilus piqueti	6		5	11	4	4	25	13	1	16
	Branchiura sowerbyi				3	1	1	8	1		1
	Limnodrilus hoffmeisteri										
	Potamothris vejdovskyi										1
	Unidentified tubificidae	2	1				3		3		3
	Unidentified					1	1				
HIRUDINEA	Helobdella elongata								1		
	Unidentified										
AEOLOSOMATIDAE											

TAXA	GENUS SPECIES	P\1\3	P\1\7	P\1\8	P\1\9	P\1\10	P\2\3	P\2\6	P\2\8	P\2\9	P\2\10
INSECTA											
COLEOPTERA											
	Bidessus sp.										1
	Stenelmis sp.										
	Halipus sp.				1			1			1
	Hydrochus sp.										
COLLEMBOLA											
	Isotomurus palustris	1									
	Sminthurides sp.										
DIPTERA											
CHIRONOMID											
	Chironominae										
	Chironomus sp.	2							2		
	Cryptochironomus fulvus		1		2		3	1	6		
	Dicrotendipes neomodestus	4	1		2	1	2			1	
	Dicrotendipes nervosus					1					
	Dicrotendipes sp. 1								2		
	Endochironomus sp.								2		
	Nilothauma babiyi	2							2		4
	Parachironomus abortivus	2									
	Paracladopelma undine	4	2	17	16	5	2	6	10	11	9
	Paralauterborniella sp.			1							
	Polypedilum convictum		1		1				2		
	Polypedilum illinoense	2		2	3			1		2	
	Polypedilum nr. scaloenum		2								2
	Pseudochironomus sp.	6						1		1	
	Robackia sp.										
	Stenochironomus sp.										
	Xenochironomus sp.				1	1			4		1
	Unidentified chironomini										
	Tanytarsini										
	Cladotanytarsus sp.	2	3			6			2		5
	Micropsectra sp.								2		1
	Rheotanytarsus sp.		1								1
	Stempellina sp.			1							
	Stempellinella sp			2							1
	Tanytarsus glabrescens	2	3	2	3		2			2	3
	Tanytarsus querlus	4	1	13				2	4	5	16
	Orthocladiinae										
	Corynoneura celeripes	2									
	Cricotopus bicinctus				1	1		3			1
	Eukiefferiella sp.										
	Nanocladius crassicornus										
	Nanocladius distinctus										
	Nanocladius rectinervis										
	Nanocladius sp.										
	Parakiefferiella sp.	6	6		2	2	4	5	8	13	5
	Rheocricotopus sp.										
	Thienemanniella nr. fusca							1			
	Thienemanniella xena										
	Unknown sp.										1
	Tanypodinae										
	Ablabesmyia parajanta	4			1		1				1
	Ablabesmyia tarella										
	Labrundinia pilosella										

TAXA	GENUS SPECIES	P\1\3	P\1\7	P\1\8	P\1\9	P\1\10	P\2\3	P\2\6	P\2\8	P\2\9	P\2\10
	Macropelopia sp.	2									
	Nilotanypus sp.						1				
	Pentaneura sp.			1							
	Procladius sp.						3	1	4		2
	Unidentified tanypodinae	2		1	1		2		2		
	Unidentified		1		1		1	1	6		9
	Ceratopogonidae										
	Alluaudomyia sp.			4	2	3			1		
	Bezzia sp.			2					4	1	3
	Empididae										
	Hemerodromia										
EPHEMEROPTERA											
	Caenis sp.										
	Ephemerella sp.										
	Tricorythodes sp.										
	Cinygmula subaequalis										
	Spinadis wallace										
	Unknown sp. A (squatty bodies)										
	Unknown sp. B (slim guys)										
	Unknown sp. C										
ODONATA											
	Argia sp.										
	Macromia sp.								1		
	Archilestes										
	Immatures		1								
PLECOPTERA											
	Perlinella ephyre										
	Immatures										
TRICHOPTERA											
	Macronema zebratum										
	Unknown hydropsychid sp.										
	Hydroptila sp.										
	Oecetis sp.	1						1			
	Chimarra sp.								1		
	Polycentropus sp.							1			2
	Lype diversa										
	Unidentified										
AMPHIPODA											
	Synurella sp.	1		1							
ISOPODA											
	Asellus sp.		3								
ACARINA		5		7		1	2	1	11		1
MOLLUSCA											
PELECYPODA	Corbicula fluminea	2	5	1	1		13	10	28	17	21
GASTROPODA	Ferrissia rivularis	2								1	1
	Amnicola sp.										
	Gyraulus sp.										
	Unidentified						1				
OTHER											
NEMATODA		20	8	17	10	3	2	2	8	4	9
NEMERTEA											
	Prostoma graecense				3						
TOTALS		92	48	79	69	30	53	98	145	66	131
SPECIES NUMBER		27	23	17	23	13	20	22	32	15	31

Luxapalila Creek, Mississippi													
Sampling Date: 9/16/87													
Raw species data: LX987RAW													
TAXA	GENUS SPECIES	P\3\1	P\3\4	P\3\7	P\3\8	P\3\10	R\1\1	R\1\2	R\1\3	R\1\4	R\1\8	R\2\3	R\2\4
PLATYHELMINTHES													
TURBELLARIA													
	Dugesia tigrina						1	2		1			
	Planaria sp.				1						1		
	Unidentified							4	1				1
ANNELIDA													
POLYCHAETA													
OLIGOCHAETA													
	Sparganophilus											1	
	Haplotaxidae												
	Lumbriculidae	1					6	35	5		3	4	3
	Naididae												
	Amphichaeta leydigi												
	Bratislavia bilongata												
	Bratislavia unindentata												
	Chaetogaster diaphanus						2						7
	Dero digitata	3											
	Dero furcata				7	2.5							
	Dero nivea				1		1		1	4			
	Dero obtusa		4	1		2.5					1	1	
	Dero trifida			1	1								
	Nais behningi												
	Nais bretscheri												
	Nais communis						2						
	Nais pardalis		2	2	2	2	1				8	1	14
	Nais pseudobtusa												
	Nais variablis				2							2	9
	Pristina aquiseta			1	1								
	Pristina leidyi		1		2								1
	Pristina synclites			2	1								
	Pristinella jenkinae										1		
	Pristinella longidentata										1		1
	Pristinella longisoma							8					
	Pristinella osborni			1	2	1	2	2		2	1		1
	Pristinella sima												
	Slavina appendiculata				1								
	Specaria josinae				1								
	Stevensoniana trivandrama							4		3			
	Unidentified naididae												
	Tubificidae												
	Aulodrilus limnobius				1								
	Aulodrilus piqueti	2	5										
	Branchiura sowerbyi		2		2								
	Limnodrilus hoffmeisteri	1	1	1									
	Potamothris vejdovskyi												
	Unidentified tubificidae		1	2	3	6		2					1
	Unidentified	1				4	1	2					
HIRUDINEA	Helobdella elongata				1								
	Unidentified					1							
AEOLOSOMATIDAE							8	6	16	2			

TAXA	GENUS SPECIES	P\3\1	P\3\4	P\3\7	P\3\8	P\3\10	R\1\1	R\1\2	R\1\3	R\1\4	R\1\8	R\2\3	R\2\4
INSECTA													
COLEOPTERA													
	Bidessus sp.												
	Stenelmis sp.		1										
	Halipus sp.		1						1				
	Hydrochus sp.						1	2					
COLLEMBOLA													
	Isotomurus palustris						1	1	5			2	
	Sminthurides sp.						4						
DIPTERA													
CHIRONOMID													
	Chironominae												
	Chironomus sp.			1	4								
	Cryptochironomus fulvus												
	Dicrotendipes neomodestus			2	3					1	7.7	15.5	6.8
	Dicrotendipes nervosus												
	Dicrotendipes sp. I			1	4	1							
	Endochironomus sp.												
	Nilothauma babiyi												
	Parachironomus abortivus												
	Paracladopelma undine	7	9	1	3								
	Paralauterborniella sp.												
	Polypedilum convictum							6			2.6	28.9	69
	Polypedilum illinoense		1					2					
	Polypedilum nr. scaloenum												
	Pseudochironomus sp.		1										
	Robackia sp.							4					
	Stenochironomus sp.		1										
	Xenochironomus sp.	1					5.2	12			51.6	4.4	
	Unidentified chironomini				1								
	Tanytarsini												
	Cladotanytarsus sp.						5.2			1		6.7	3.5
	Micropsectra sp.												
	Rheotanytarsus sp.				1		39.5	29	4			11.1	
	Stempellina sp.												
	Stempellinella sp												
	Tanytarsus glabrescens	1							4		18.1	6.7	10.4
	Tanytarsus querlus		1										
	Orthocladiinae												
	Corynoneura celeripes							2					
	Cricotopus bicinctus	1		2	1		5.2	2			33.5	15.5	
	Eukiefferiella sp.												
	Nanocladius crassicornus												
	Nanocladius distinctus												
	Nanocladius rectinervis												
	Nanocladius sp.												
	Parakiefferiella sp.		7	1	3		2.6	6	8	1			6.8
	Rheocricotopus sp.						5.2						
	Thienemanniella nr. fusca	1	2				10.5	6	6	2	7.7	22.2	72.5
	Thienemanniella xena						23.6						
	Unknown sp.												
	Tanypodinae												
	Ablabesmyia parajanta	1		1	2						2.6		
	Ablabesmyia tarella												
	Labrundinia pilosella						5.2	4					

TAXA	GENUS SPECIES	P\3\1	P\3\4	P\3\7	P\3\8	P\3\10	R\1\1	R\1\2	R\1\3	R\1\4	R\1\8	R\2\3	R\2\4
	Macropelopia sp.												
	Nilotanypus sp.						21	4		1	5.2		
	Pentaneura sp.												
	Procladius sp.		1										
	Unidentified tanypodinae				1								3.5
	Unidentified				1		8		2				
	Ceratopogonidae												
	Alluaudomyia sp.												
	Bezzia sp.		1		2	3							3.5
	Empididae												
	Hemerodromia												
EPHEMEROPTERA													
	Caenis sp.												
	Ephemerella sp.												
	Tricorythodes sp.											2	2
	Cinygmula subaequalis												
	Spinadis wallace												
	Unknown sp. A (squatty bodies)							1	1	1		1	
	Unknown sp. B (slim guys)												
	Unknown sp. C												
ODONATA													
	Argia sp.										1		
	Macromia sp.												
	Archilestes												
	Immatures												
PLECOPTERA													
	Perlinella ephyre												
	Immatures								1				
TRICHOPTERA													
	Macronema zebratum										10		
	Unknown hydropsychid sp.												
	Hydroptila sp.								4	4		4	6
	Oecetis sp.								1	1	1	3	3
	Chimarra sp.						68	35	15	5		4	4
	Polycentropus sp.												
	Lype diversa												
	Unidentified											2	
AMPHIPODA													
	Synurella sp.												
ISOPODA													
	Asellus sp.												
ACARINA				2	7		38	48	39	13	17	60	40
MOLLUSCA													
PELECYPODA	Corbicula fluminea		3		1	1	4	1	5	11	8	17	22
GASTROPODA	Ferrissia rivularis			3								13	5
	Amnicola sp.								1				
	Gyraulus sp.			3									
	Unidentified					1							
OTHER													
NEMATODA		3	19	10	24	3	4		1		4	2	3
NEMERTEA													
	Prostoma graecense										1	5	
TOTALS		23	64	38	87	28	267.2	232	111	67	189	235	299
SPECIES NUMBER		12	20	10	31	12	26	26	20	16	23	25	25

Luxapalila Creek, Mississippi
Sampling Date: 9/16/87

Counts of major taxa: raw data
(for those samples identified to species, counts are summed here, all others (*) are raw data)

MAJOR TAXA	R\1\1	R\1\2	R\1\3	R\1\4	R\1\8	R\2\3	R\2\4	R\2\6	R\2\8	R\2\9	R\2\10	R\3\1	R\3\2*	R\3\3	R\3\4	R\3\5	R\3\6*	R\3\7*	R\3\8*	R\3\9*	R\3\10
Turbellaria	1	6	1	1	1	0	1	1	1	4	0	12		17	0	14	4	2		7	0
Oligochaeta	15	53	6	9	15	9	37	11	17	16	16	46	72	320	76	69	27	42	32	46	37
Chironomidae	131	77	24	6	129	111	173	50	154	109	142	15	36	51	48	122	5	12	3	4	4
Ceratopogonid	0	0	0	0	0	0	3	0	0	0	0	0		0	0	0			1		1
Coleoptera	1	2	1	0	0	0	0	1	1	0	0	0		0	0	1					0
Ephemeroptera	0	1	1	1	0	3	2	1	11	25	4	0	13	6	10	5		1			0
Odonata	0	0	0	0	1	0	0	0	1	0	0	1		1	3	1					2
Plecoptera	0	0	1	0	0	0	0	0	0	0	0	0		2	0	2					0
Trichoptera	68	35	20	10	11	13	13	13	15	21	20	8	3	7	11	7		3	1	1	1
Amphipoda	0	0	0	0	0	0	0	0	0		0	0		0	0	0					0
Isopoda	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0					0
Bivalvia	4	1	5	11	8	17	22	9	22	23	30	39	35	132	55	11	7	7	2	15	25
Gastropoda	0	0	1	0	0	13	5	0	13	56	15	4	8	0	2	8				1	0
MINOR GROUPS																					
Acarina	38	48	39	13	17	60	40	47	104	220	152	5	6	36	16	31	6	12	13	13	16
Polychaeta	0	0	0	0	0	0	0	0	0	0		0		0	0	0					0
Hirudinea	0	0	0	0	0	0	0	0	0	0	0	1		0	0	0					0
Empididae	0	0	0	0	0	0	0	0	1		0	0		0	0	0					0
Collembola	5	1	5	0	0	2	0	0	0	0	0	0		0	0	0			1	2	0
Nematoda	4	0	1	0	4	2	3	1	3	11	4	3	5	14	20	6	2	2	1	2	3
Nemertea	0	0	0	0	1	5	0	1	1	0	2	1	7	9	0	4	2	4		3	4
Aeolosomatidae	0	8	6	16	2	0	0	0	9	5	0	6		98	44	21					3
TOTAL	267	232	111	67	189	235	299	135	353	490	385	141	185	693	285	302	53	85	54	94	96

Luxapalila Creek, Mississippi										
Sampling Date: 9/16/87										
Raw species data: LX987RAW										
TAXA	GENUS SPECIES	R\2\6	R\2\8	R\2\9	R\2\10	R\3\1	R\3\3	R\3\4	R\3\5	R\3\10
PLATYHELMINTHES										
TURBELLARIA										
	Dugesia tigrina	1		1		8	6		10	
	Planaria sp.						4			
	Unidentified		1	3		4	7		4	
ANNELIDA										
POLYCHAETA										
OLIGOCHAETA										
	Sparganophilus									
	Haplotaxidae									
	Lumbriculidae					2				
	Naididae									
	Amphichaeta leydigi									
	Bratislavia bilongata			2						
	Bratislavia unindentata							4		
	Chaetogaster diaphanus	3	4	12	3			5	12.5	7
	Dero digitata						10.7	1.9		3.3
	Dero furcata									
	Dero nivea					18	85.4	14.9	12.5	1.7
	Dero obtusa					12	10.7	7.5		6.7
	Dero trifida							3.7		3.3
	Nais behningi								1.8	
	Nais bretscheri							1	3.5	
	Nais communis					2				
	Nais pardalis	3	8		1		44.5	7	30.2	
	Nais pseudobtusa				1		26.7		1.8	
	Nais variablis				8	2		2		
	Pristina aquiseta	2	1							
	Pristina leidyi		4		3		44.5	8	3.5	
	Pristina synclites									
	Pristinella jenkinae									
	Pristinella longidentata									1
	Pristinella longisoma									
	Pristinella osborni						53.4	5		14
	Pristinella sima							2		
	Slavina appendiculata					4	26.7	6	3.5	
	Specaria josinae									
	Stevensoniana trivandrama						8.9	2		
	Unidentified naididae							5		
	Tubificidae									
	Aulodrilus limnobius									
	Aulodrilus piqueti									1
	Branchiura sowerbyi									
	Limnodrilus hoffmeisteri									
	Potamothris vejdovskyi									
	Unidentified tubificidae	2				2		1		
	Unidentified	1		2		4	8.9			
HIRUDINEA	Helobdella elongata									
	Unidentified					1				
AEOLOSOMATIDAE			9	5		6	97.9	44	21.3	3

TAXA	GENUS SPECIES	R\2\6	R\2\8	R\2\9	R\2\10	R\3\1	R\3\3	R\3\4	R\3\5	R\3\10
INSECTA										
COLEOPTERA										
	Bidessus sp.									
	Stenelmis sp.									
	Halipus sp.	1	1							
	Hydrochus sp.								1	
COLLEMBOLA										
	Isotomurus palustris									
	Sminthurides sp.									
DIPTERA										
CHIRONOMID										
	Chironominae									
	Chironomus sp.									
	Cryptochironomus fulvus				2.8		4.1			
	Dicrotendipes neomodestus	6	21.6	8.7	36.2			2	2.4	
	Dicrotendipes nervosus									
	Dicrotendipes sp. I									
	Endochironomus sp.									
	Nilothauma babiyi				2.8					
	Parachironomus abortivus									
	Paracladopelma undine			2.2						
	Paralauterborniella sp.									
	Polypedilum convictum	12	33.8	10.9	16.8	1		1	4.8	
	Polypedilum illinoense	2	9.2				4.1			
	Polypedilum nr. scaloenum									
	Pseudochironomus sp.			2.2						
	Robackia sp.									1
	Stenochironomus sp.									
	Xenochironomus sp.		6.2			1				
	Unidentified chironomini									
	Tanytarsini							2		
	Cladotanytarsus sp.	4	3.1		13.9			1		
	Micropsectra sp.									
	Rheotanytarsus sp.	2	21.6	8.7	5.5		2			
	Stempellina sp.									
	Stempellinella sp									
	Tanytarsus glabrescens	2	6.2	13.1	11.1		4.1			
	Tanytarsus querlus		3.1				4.1			
	Orthocladiinae									
	Corynoneura celeripes									
	Cricotopus bicinctus	2	12.2	2.2	2.8	4		11	74	
	Eukiefferiella sp.								4.8	
	Nanocladius crassicornus							1		
	Nanocladius distinctus							4		
	Nanocladius rectinervis							5		
	Nanocladius sp.									
	Parakiefferiella sp.	4	6.2	24	8.4	1	28.6		7.2	2
	Rheocricotopus sp.									
	Thienemanniella nr. fusca	16	27.7	13	33.4			7	26.4	
	Thienemanniella xena									
	Unknown sp.									1
	Tanypodinae									
	Ablabesmyia parajanta			4.4	2.8	5	4.1	10		
	Ablabesmyia tarella							1		
	Labrundinia pilosella			2.2		1				

TAXA	GENUS SPECIES	R\2\6	R\2\8	R\2\9	R\2\10	R\3\1	R\3\3	R\3\4	R\3\5	R\3\10
	Macropelopia sp.									
	Nilotanypus sp.			6.5	5.5			1		
	Pentaneura sp.									
	Procladius sp.									
	Unidentified tanypodinae					1		1		
	Unidentified		3.1	10.9		1		1	2.4	
	Ceratopogonidae									
	Alluaudomyia sp.									
	Bezzia sp.									1
	Empididae									
	Hemerodromia		1							
EPHEMEROPTERA										
	Caenis sp.		1					2		
	Ephemerella sp.							4		
	Tricorythodes sp.	1	8	14			5	4		
	Cinygmula subaequalis			4						
	Spinadis wallace			3						
	Unknown sp. A (squatty bodies)		2	4	4		1		2	
	Unknown sp. B (slim guys)								3	
	Unknown sp. C									
ODONATA										
	Argia sp.					1		3	1	
	Macromia sp.									1
	Archilestes		1							
	Immatures						1			1
PLECOPTERA										
	Perlinella ephyre								1	
	Immatures						2		1	
TRICHOPTERA										
	Macronema zebratum				1					
	Unknown hydropsychid sp.									
	Hydroptila sp.	2	12	6	8		1	3	3	
	Oecetis sp.	2	1	9	3	1	4	3		1
	Chimarra sp.	9	2	6	2	7	2		4	
	Polycentropus sp.				6					
	Lype diversa							5		1
	Unidentified									
AMPHIPODA										
	Synurella sp.									
ISOPODA										
	Asellus sp.									
ACARINA		47	104	220	152	5	36	16	31	16
MOLLUSCA										
PELECYPODA	Corbicula fluminea	9	22	23	30	39	132	55	11	25
GASTROPODA	Ferrissia rivularis		13	56	15	4		2	8	
	Amnicola sp.									
	Gyraulus sp.									
	Unidentified									
OTHER										
NEMATODA		1	3	11	4	3	14	20	6	3
NEMERTEA										
	Prostoma graecense	1	1		2	1	9		4	4
TOTALS		135	353	490	385	141	693.4	285	302.6	96
SPECIES NUMBER		24	32	30	28	28	32	42	31	19

APPENDIX B

SPECIES COMPOSITION IN BENTHIC SAMPLES COLLECTED IN THE SPRING OF 1988

Luxapalila Creek, Mississippi
Sampling Date: 6/26-27/1988
LX688CNT

Counts of major taxa: raw data
(for those samples identified to species, counts are summed here, all others (*) are raw data)

SITE																				
TAXA	P\1\2*	P\1\5*	P\1\7*	P\1\9*	P\1\10	P\2\2	P\2\4	P\2\6	P\2\8	P\2\10	P\3\1*	P\3\2*	P\3\3*	P\3\6*	P\3\7*	P\4\6	P\4\7	P\4\8	P\4\9	P\4\10
Turbellaria				1	1					1		4						1		
Oligochaeta	16	20	7	12	18	3	9	15	18	27	10	11	14	17	21	21	17	18	15	17
Chironomidae	34	25	19	27	31	23	35	41	60	63	21	27	17	22	19	25	27	30	40	49
Ceratopogonid				3	2					4										
Coleoptera						1		1		1					1	1				
Ephemeroptera																				
Odonata	1														1					
Plecoptera			1			1												1		
Trichoptera						1		2		1	2		1	2			2	2	1	1
Amphipoda						1														
Isopoda		1	1																	
Bivalvia	2	4	4	1		2	4	13	7	6	2	3	2	1			2		1	
Gastropoda	1				2	1	1			1	1	4	2						1	2
MINOR GROUPS																				
Acarina	3	2	2			1	1	2	4	2				1	1				2	1
Polychaeta																				
Hirudinea							1													
Empididae																				
Collembola																				
Nematoda	5	3	6	1	5		5	3	2	4	1	4	2	4	1	2	1	1	2	4
Nemertea																				
Aeolosomatidae																				
TOTAL	62	55	40	45	59	34	56	77	91	110	37	53	38	47	44	49	49	53	62	74

Luxapalila Creek, Mississippi
Sampling Date: 6/27-28/88

Raw species data

TAXA	GENUS SPECIES	SITE P\2\2	P\2\4	P\2\6	P\2\8	P\2\10	P\4\6	P\4\7	P\4\8	P\4\9
PLATYHELMINTHES										
TURBELLARIA										
	Dugesia tigrina					1			1	
	Planaria sp.									
	Unidentified									
ANNELIDA										
POLYCHAETA										
OLIGOCHAETA										
	Sparganophilus									
	Haplotaxidae									
	Lumbriculidae							1		
	Naididae									
	Amphichaeta leydigi		1							
	Bratislavia bilongata									
	Bratislavia unindentata									
	Chaetogaster diaphanus			1						
	Dero digitata									
	Dero furcata									
	Dero nivea								5	
	Dero obtusa				1		1			1
	Dero trifida									
	Homochaeta naidina							1		
	Nais behningi									
	Nais bretscheri									
	Nais communis									
	Nais pardalis									
	Nais pseudobtusa									
	Nais variablis									
	Piquetiella michiganesis									1
	Pristina aquiseta					1				
	Pristina leidyi							1		
	Pristina synclites									
	Pristinella jenkinae							1		
	Pristinella longidentata									
	Pristinella longisoma									
	Pristinella osborni									3
	Pristinella sima									
	Slavina appendiculata		1							
	Specaria josinae	2	3	2	4	3		4	3	
	Stevensoniana trivandrama									
	Unidentified naididae									
	Tubificidae									
	Aulodrilus limnobius						1	4		
	Aulodrilus piqueti	1			1	2	8		1	
	Aulodrilus pluriseta								2	
	Branchiura sowerbyi			1			1			
	Limnodrilus hoffmeisteri						2			
	Potamothris vejdovskyi									
	Unidentified tubificidae		3	5	1	3	1	1		3
	Unidentified					1		3	1	2

TAXA	GENUS SPECIES	P\2\2	P\2\4	P\2\6	P\2\8	P\2\10	P\4\6	P\4\7	P\4\8	P\4\9
HIRUDINEA	Helobdella elongata		1							
	Unidentified									
AEOLOSOMATIDAE										1
ARTHROPODA										
INSECTA										
COLEOPTERA										
	Bidessus sp.									
	Stenelmis sp.									
	Halipus sp.	1		1		1	1			
	Hydrochus sp.									
COLLEMBOLA										
	Isotomurus palustris									
	Sminthurides sp.									
DIPTERA										
CHIRONOMID										
	Chironominae									
	Chironomus sp.						3	2	1	5
	Cryptochironomus fulvus	3	3	2	5	3				
	Dicrotendipes neomodestus									1
	Dicrotendipes nervosus	1	2	3						
	Dicrotendipes sp. I		1	1	4		1			1
	Endochironomus sp.			1	1		3	1		
	Glyptotendipes	1			1	1				
	Harnischia sp.				1					
	Nilothauma babiyi								1	
	Parachironomus abortivus									
	Paracladopelma undine	6	8	3	7	17	3	8	8	12
	Paralauterborniella sp.									
	Paratendipes albimanus						1			
	Phaenopsectra dyair									1
	Polypedilum convictum					2		1	1	
	Polypedilum illinoense									
	Polypedilum nr. scaloenum		1	4	7	3	2	11	3	1
	Pseudochironomus sp.			2	1	1				
	Robackia sp.									
	Stenochironomus sp.									
	Stictochironomus sp.						1	1		
	Xenochironomus sp.									
	Unidentified chironomini									
	Tanytarsini									
	Cladotanytarsus sp.									
	Micropsectra sp.									
	Rheotanytarsus sp.									1
	Stempellina sp.				1					
	Stempellinella sp									
	Tanytarsus glabrescens	2	5	1	2	2		1		2
	Tanytarsus querlus	2	5	11	13	3	2	8	12	7
	Orthocladiinae									
	Corynoneura celeripes									
	Corynoneura taris									
	Cricotopus bicinctus									
	Eukiefferiella sp.									
	Nanocladius crassicornus									
	Nanocladius distinctus									

TAXA	GENUS SPECIES	P\2\2	P\2\4	P\2\6	P\2\8	P\2\10	P\4\6	P\4\7	P\4\8	P\4\9
	Nanocladius rectinervis									
	Nanocladius sp.					1				
	Parakiefferiella sp.		7	9	4	7		1		
	Rheocricotopus sp.									
	Thienemanniella nr. fusca				1					
	Thienemanniella xena									
	Unknown sp.									
	Tanypodinae									
	Ablabesmyia parajanta		1		4	1				
	Ablabesmyia tarella		1		1	1				
	Labrundinia pilosella									
	Macropelopia sp.									
	Nilotanypus sp.									
	Pentaneura sp.									
	Procladius sp.	6	1	1	3	8	2	4	2	6
	Unidentified tanypodinae				2		6		2	
	Unidentified	2		2	3	3	2			2
	Ceratopogonidae									
	Alluaudomyia sp.			1		2				
	Bezzia sp.					2	1			1
	Empididae									
	Hemerodromia									
EPHEMEROPTERA										
	Caenis sp.									
	Ephemerella sp.									
	Tricorythodes sp.									
	Cinygmula subaequalis									
	Spinadis wallace									
	Unknown sp. A (squatty bodies)									
	Unknown sp. B (slim guys)									
	Unknown sp. C									
ODONATA										
	Argia sp.									
	Macromia sp.									
	Archilestes								1	
	Immatures									
PLECOPTERA										
	Perlinella ephyre									
	Immatures	1							1	
TRICHOPTERA										
	Macronema zebratum									
	Unknown hydropsychid sp.									
	Hydroptila sp.	1		2				1	1	
	Oecetis sp.									
	Chimarra sp.							1		1
	Polycentropus sp.									
	Lype diversa									
	Unidentified					1				
AMPHIPODA										
	Synurella sp.									
ISOPODA										
	Asellus sp.									
ACARINA		1	1	2	4	2				2

TAXA	GENUS SPECIES	P\2\2	P\2\4	P\2\6	P\2\8	P\2\10	P\4\6	P\4\7	P\4\8	P\4\9
MOLLUSCA										
PELECYPODA	Corbicula fluminea	2	4	13	7	6		2		1
GASTROPODA	Ferrissia rivularis	1	1			1				1
	Amnicola sp.									
	Gyraulus sp.									
	Unidentified									
OTHER										
NEMATODA			5	3	2	4	2	1	1	2
NEMERTEA										
	Prostoma graecense									
TOTAL NUMBER		33	55	71	81	83	44	59	46	58
NUMBER OF SPECIES		16	20	22	25	28	20	22	17	23

Luxapalila Creek, Mississippi
Sampling Date: 6/26-27/1988
LX688CNT

Counts of major taxa: raw data
(for those samples identified to species, counts are summed here, all others (*) are raw data)

TAXA	R\1\1*	R\1\3*	R\1\4*	R\1\5*	R\1\10	R\2\1	R\2\2	R\2\3	R\2\4	R\2\5	R\3\1*	R\3\2*	R\3\4*	R\3\8*	R\3\9*	R\4\5	R\4\7	R\4\8	R\4\9	R\4\10
Turbellaria	4	6	7	6	2	4	4	1	2	5	5	2	1	4	3	1		18		
Oligochaeta	26	21	24	33	17	32	30	27	21	17	15	12	20	21	17	24	21	47	20	15
Chironomidae	54	46	56	57	40	103	108	117	94	86	49	52	55	50	57	47	49		43	51
Ceratopogonid																				
Coleoptera		1					1										1			
Ephemeroptera				2							4		1		3					
Odonata						1					1					1				
Plecoptera																14		8	2	2
Trichoptera	10	6	2	7	3	20	9	12	13	13		6	5	5	2	3	13	5	8	4
Amphipoda																				
Isopoda																				
Bivalvia	21	7	16	21	12	2	4	2	11	8	31	14	19	28	11	4	4	7	2	5
Gastropoda	2	2	3																	
MINOR GROUPS																				
Acarina	11	9	5	14	8	16	11	20	14	17	1	1	5	2	7	6	8	14	10	11
Polychaeta																				
Hirudinea								1					1							
Empididae																				
Collembola				1	1															2
Nematoda	1	2	2					2	1		1	1			1	1	1	2	1	1
Nemertea		2	1						1		2	2								
Aeolosomatidae																				
TOTAL	129	102	116	141	83	178	167	182	157	146	109	90	107	110	101	101	97	101	86	91

Luxapalila Creek, Mississippi
Sampling Date: 6/27-28/88

Raw species data

TAXA	GENUS SPECIES	P\4\10	R\2\1	R\2\2	R\2\3	R\2\4	R\2\5	R\4\5	R\4\7	R\4\8	R\4\9	R\4\10
PLATYHELMINTHES												
TURBELLARIA												
	Dugesia tigrina		4	2	1	2		1		2		
	Planaria sp.			2								
	Unidentified											
ANNELIDA												
POLYCHAETA												
OLIGOCHAETA												
	Sparganophilus											
	Haplotaxidae											
	Lumbriculidae	5							2		1	
	Naididae											
	Amphichaeta leydigi											
	Bratislavia bilongata											
	Bratislavia unindentata											
	Chaetogaster diaphanus							1				
	Dero digitata		2					4				
	Dero furcata											
	Dero nivea	1		7	6		3					
	Dero obtusa			4		25	1	9				
	Dero trifida			1		1						1
	Homochaeta naidina											
	Nais behningi											
	Nais bretscheri											
	Nais communis											
	Nais pardalis	2	2	1	3	1	3	1		1		
	Nais pseudobtusa		1								1	1
	Nais variablis		4	1	1	5	1	4				
	Piquetiella michiganesis	1							1	9	6	4
	Pristina aequiseta					3			3	1		
	Pristina leidyi			1	2	2	3					2
	Pristina synclites		1									
	Pristinella jenkinae											
	Pristinella longidentata											
	Pristinella longisoma					1						
	Pristinella osborni	1	2		1	1	1			1	1	3
	Pristinella sima											
	Slavina appendiculata		3		1		1					
	Specaria josinae											
	Stevensoniana trivandrama											
	Unidentified naididae			2								
	Tubificidae											
	Aulodrilus limnobius											
	Aulodrilus piqueti								1			1
	Aulodrilus pluriseta											
	Branchiura sowerbyi				3		2					
	Limnodrilus hoffmeisteri											
	Potamothris vejdovskyi											
	Unidentified tubificidae							2	1	1	1	
	Unidentified	3	1			3		1	1		1	3

TAXA	GENUS SPECIES	P\4\10	R\2\1	R\2\2	R\2\3	R\2\4	R\2\5	R\4\5	R\4\7	R\4\8	R\4\9	R\4\10
HIRUDINEA	Helobdella elongata				1							
	Unidentified											
AEOLOSOMATIDAE			10		3	1	2	4				
ARTHROPODA												
INSECTA												
COLEOPTERA												
	Bidessus sp.											
	Stenelmis sp.											
	Halipus sp.			1					1			
	Hydrochus sp.											
COLLEMBOLA												
	Isotomurus palustris											2
	Sminthurides sp.											
DIPTERA												
CHIRONOMID												
	Chironominae											
	Chironomus sp.	1	1									
	Cryptochironomus fulvus											
	Dicrotendipes neomodestus		11	11	15	7	7		2	2		
	Dicrotendipes nervosus											
	Dicrotendipes sp. I	2	6	2	2	4	1					
	Endochironomus sp.	4				1						
	Glyptotendipes											
	Harnischia sp.											
	Nilothauma babiyi										2	
	Parachironomus abortivus	1										
	Paracladopelma undine	8		1	1							
	Paralauterborniella sp.											
	Paratendipes albimanus	1										
	Phaenopsectra dyair	1										
	Polypedilum convictum		2	2	1	3	2	24	6	6	8	4
	Polypedilum illinoense		1									
	Polypedilum nr. scaloenum	6							2	6	2	
	Pseudochironomus sp.					1	1					
	Robackia sp.							10			2	14
	Stenochironomus sp.											
	Stictochironomus sp.					1						
	Xenochironomus sp.		1									
	Unidentified chironomini											
	Tanytarsini											
	Cladotanytarsus sp.		1			3			6	4	4	18
	Micropsectra sp.											
	Rheotanytarsus sp.		2		1		2	6			6	8
	Stempellina sp.											
	Stempellinella sp											
	Tanytarsus glabrescens	1	2	7	3	2	5	4	12	2		
	Tanytarsus querlus	10	2			1	1		10	10	2	
	Orthocladiinae											
	Corynoneura celeripes								4	4	2	
	Corynoneura taris							4				
	Cricotopus bicinctus		1	6	23	12	7					
	Eukiefferiella sp.										2	
	Nanocladius crassicornus		1									
	Nanocladius distinctus		1		1	1	1					

TAXA	GENUS SPECIES	P\4\10	R\2\1	R\2\2	R\2\3	R\2\4	R\2\5	R\4\5	R\4\7	R\4\8	R\4\9	R\4\10
	Nanocladius rectinervis											
	Nanocladius sp.											
	Parakiefferiella sp.		13	10	3	1					2	
	Rheocricotopus sp.		1							2	2	
	Thienemanniella nr. fusca		38	64	57	51	36					2
	Thienemanniella xena											
	Unknown sp.	1									2	
	Tanypodinae											
	Ablabesmyia parajanta		1									
	Ablabesmyia tarella		1		1							
	Labrundinia pilosella											
	Macropelopia sp.									4		
	Nilotanypus sp.								4	2		
	Pentaneura sp.											
	Procladius sp.	8	1		1							
	Unidentified tanypodinae	4				2	1					2
	Unidentified	2	2	3	1		2		4	4	6	
	Ceratopogonidae											
	Alluaudomyia sp.											
	Bezzia sp.											
	Empididae											
	Hemerodromia											
EPHEMEROPTERA												
	Caenis sp.											
	Ephemerella sp.											
	Tricorythodes sp.											
	Cinygmula subaequalis											
	Spinadis wallace											
	Unknown sp. A (squatty bodies)											
	Unknown sp. B (slim guys)											
	Unknown sp. C											
ODONATA												
	Argia sp.							1				
	Macromia sp.											
	Archilestes											
	Immatures		1									
PLECOPTERA												
	Perlinella ephyre											
	Immatures							14		8	2	2
TRICHOPTERA												
	Macronema zebratum											
	Unknown hydropsychid sp.											
	Hydroptila sp.	1	12	6	8	7	10	2		2	6	1
	Oecetis sp.		3	1		1	1		13	3		3
	Chimarra sp.		5	2	4	5	2	1			2	
	Polycentropus sp.											
	Lype diversa											
	Unidentified											
AMPHIPODA												
	Synurella sp.											
ISOPODA												
	Asellus sp.											
ACARINA		1	16	11	20	14	17	6	8	14	10	11

TAXA	GENUS SPECIES	P\4\10	R\2\1	R\2\2	R\2\3	R\2\4	R\2\5	R\4\5	R\6\7	R\6\8	R\6\9	R\6\10
MOLLUSCA												
PELECYPODA	Corbicula fluminea		2	4	2	11	8	4	4	7	2	5
GASTROPODA	Ferrissia rivularis	2										
	Amnicola sp.											
	Gyraulus sp.											
	Unidentified											
OTHER												
NEMATODA		4			2	1		1	1	2	1	1
NEMERTEA												
	Prostoma graecense			1		1			1			
TOTAL NUMBER		71	158	153	166	175	121	104	87	[illegible]	[illegible]	[illegible]
NUMBER OF SPECIES		24	36	25	28	32	26	21	21	[illegible]	[illegible]	[illegible]

APPENDIX C

COUNTS OF MAJOR TAXA PER CORE SAMPLE, FALL, 1988

Luxapalila Creek, Mississippi
Sampling Date: 10/1988
LX1088C

Counts of major taxa: raw data
(for those samples identified to species, counts are summed here, all others (*) are raw data)

TAXA	P/1/1	P/1/2	P/1/6	P/1/7	P/1/9	P/2/1	P/2/2	P/2/4	P/2/5	P/2/7	P/3/1	P/3/2	P/3/3	P/3/4	P/3/9	P/4/2	P/4/4	P/4/5	P/4/6	P/4/9
	SITE																			
Turbellaria	2	2			3	2	3					2					1			2
Oligochaeta	15	12	17	10	12	11	11	10	8	8	32	19	17	27	27	5	12	10	8	12
Chironomidae	31	25	27	32	19	34	21	30	28	23	39	36	30	31	33	18	14	36	10	0
Ceratopogonid							2		3					4		5	5	1		
Coleoptera		1						2			1						1			
Ephemeroptera									2		2			3			2		2	2
Odonata		1					1													
Plecoptera				1														1		
Trichoptera	3		2	1	3			3	2	4	5	6	2	7	5	5	2	10	6	3
Amphipoda																				
Isopoda													1		1					
Bivalvia	2	3	4	2	5	2		2	3	3	7	14	8	7	11		2	3	1	4
Gastropoda			1								1	1				1				
MINOR GROUPS																				
Acarina	1		2	3	6	1		1	4	5	3	2	1	1	1	1	3	5	5	
Polychaeta																				
Hirudinea							1											1		
Empididae										1										
Collembola					2											2				
Nematoda	3		3				2	2	3						4	5		4	1	1
Nemertea				1		1	1								1	1				
Aeolosomatidae																				
Tanyderidae							1													
TOTAL	57	44	56	50	50	51	43	50	53	44	90	80	59	80	83	43	42	71	33	24

Luxapalila Creek, Mississippi														
Sampling Date: 10/88														
LX1088SQ														TOTAL
		SITE					FREQ						FREQ	FREQ
TAXA	GENUS SPECIES	P\2\1	P\2\2	P\2\4	P\2\5	P\2\7	P/2	P\4\2	P\4|4	P\4\5	P\4\6	P\4\9	P/4	10
PLATYHELMINTHES														
TURBELLARIA														
	Dugesia tigrina	2	3				2		1			2	2	4
	Planaria sp.													
	Unidentified													
ANNELIDA														
POLYCHAETA														
OLIGOCHAETA	Sparganophilus													
	Haplotaxidae													
	Lumbriculidae		1				1		2	3			2	3
	Naididae													
	Amphichaeta leydigi			1	1		2							2
	Bratislavia bilongata													
	Bratislavia unindentata													
	Chaetogaster diaphanus													
	Dero digitata													
	Dero furcata													
	Dero nivea													
	Dero obtusa													
	Dero trifida													
	Dero sp.		2		2	1	3							3
	Homochaeta naidina													
	Nais behningi													
	Nais bretscheri													
	Nais communis													
	Nais pardalis													
	Nais pseudobtusa													
	Nais simplex													
	Nais variablis													
	Piquetiella michiganesis											3	1	1
	Pristina aquiseta													
	Pristina leidyi											1		
	Pristina synclites													
	Pristina sp.													
	Pristinella jenkinae													
	Pristinella longidentata													
	Pristinella longisoma													
	Pristinella osborni													
	Pristinella sima													
	Slavina appendiculata													
	Specaria josinae			1			1							1
	Stevensoniana trivandrama													
	Unidentified naididae													
	Tubificidae													
	Aulodrilus limnobius		1				1			1			1	2
	Aulodrilus piqueti	4			2	4	3	3		2	3	4	4	7
	Aulodrilus pluriseta							1	1		1	1	4	4
	Branchiura sowerbyi	3		4	2	2	4							4
	Limnodrilus hoffmeisteri	1	1			1	3	1	1	1			3	6
	Limnodrilus rubripenis													
	Potamothris vejdovskyi													

TAXA	GENUS SPECIES	P\2\1	P\2\2	P\2\4	P\2\5	P\2\7	AVG	P\4\2	P\4\4	P\4\5	P\4\6	P\4\9	AVG	TOTAL
	Unidentified tubificidae	3	6	4			3		8	3	4	4	4	7
	Enchytraididae													
	Barbidrilus paucisetus													
	Unidentified				1		1							1
HIRUDINEA	Helobdella elongata		1				1							1
	Actinobdella sp.									1			1	1
	Unidentified	1					1							1
AEOLOSOMATIDAE														
ARTHROPODA														
INSECTA														
COLEOPTERA														
	Bidessus sp.													
	Stenelmis sp.													
	Halipus sp.			2			1		1				1	2
	Hydrochus sp.													
COLLEMBOLA														
	Isotomurus palustris							2					1	1
	Sminthurides sp.													
	Unidentified													
DIPTERA														
CHIRONOMID														
	Chironominae													
	Chironomus sp.													
	Cladopelma	2					1							1
	Cryptochironomus fulvus													
	Cryptochironomus sp.		1			1	2	1	1				2	4
	Dicrotendipes neomodestus			1			1							1
	Dicrotendipes nervosus Type 1													
	Dicrotendipes sp. I													
	Endochironomus sp.													
	Glyptotendipes									1			1	1
	Harnischia sp.		1		1		2							2
	Nilothauma babiyi	1			1		2	2		1			2	4
	Parachironomus abortivus													
	Paracladopelma undine			1			1							1
	Paralauterborniella nigrohalt	2	1	5	2	1	5		1	1			2	7
	Paratendipes albimanus													
	Paratendipes nudisquama									1			1	1
	Phaenopsectra dyair													
	Phaenopsectra flavipes									1			1	1
	Polypedilum convictum			2			1			2			1	2
	Polypedilum illinoense	1					1							1
	Polypedilum nr. scaloenum	7	5	9	1	2	5	1	2	1	3		4	9
	Pseudochironomus sp.	1	2		2	2	4			1	1		2	6
	Robackia sp.													
	Stenochironomus sp.													
	Stictochironomus sp.													
	Xenochironomus sp.													
	Unidentified chironomini							1					1	1
	Tanytarsini													
	Cladotanytarsus sp.			1		1	2							2
	Micropsectra sp.													
	Rheotanytarsus sp.			1	2		2			10			1	3
	Stempellina sp.	1					1							1

TAXA	GENUS SPECIES	P\2\1	P\2\2	P\2\4	P\2\5	P\2\7	AVG	P\4\2	P\4\4	P\4\5	P\4\6	P\4\9	AVG	TOTAL
	Stempellinella sp													
	Tanytarsus coffmani													
	Tanytarsus glabrescens		2		6	5	3							3
	Tanytarsus querlus	6			2		2			2			1	3
	Unidentified tanytarsini													
	Orthocladiinae													
	Corynoneura celeripes													
	Corynoneura taris													
	Corynoneura sp													
	Cricotopus bicinctus	2		2	3		3	1					1	4
	Cricotopus sp		1				1							1
	Eukiefferiella sp.	3					1							1
	Nanocladius crassicornus			1			1			3			1	2
	Nanocladius distinctus													
	Nanocladius rectinervis													
	Nanocladius minimus		1				1							1
	Nanocladius sp.				3	2	2	2	1				2	4
	Parakiefferiella sp.				1		1							1
	Rheocricotopus sp.													
	Thienemannimyia										1		1	1
	Thienemanniella nr. fusca			1			1							1
	Thienemanniella xena									1			1	1
	Unidentified orthocladinae									2			1	1
	Tanypodinae													
	Ablabesmyia mallochi			1			1							1
	Ablabesmyia parajanta		5	3	1	7	4	4		7	1		3	7
	Ablabesmyia tarella													
	Clinotanypus									1			1	1
	Labrundinia pilosella					1	1							1
	Macropelopia sp.													
	Natarsia sp													
	Nilotanypus sp.													
	Pentaneura sp.													
	Procladius sp.	4	5	2	2	1	5	3	9	1	3		4	9
	Unidentified tanypodinae	2					1	2					1	2
	Diamesinae													
	Potthesia	1					1							1
	Unidentified Chironomidae	1			1		2	1			1		2	4
	Ceratopogonidae													
	Alluaudomyia sp.							1		1			2	2
	Bezzia sp.		2		3		2	4	5				2	4
	Unidentified ceratopogonid													
	Empididae													
	Hemerodromia					1	1							1
	Tanyderidae		1				1							1
	Simuliidae													
	Simulium sp.													
EPHEMEROPTERA														
	Baetisca sp								1				1	1
	Caenis sp.													
	Ephemerella sp.													
	Tricorythodes sp.													
	Cinygmula subaequalis													
	Stenonema sp.													

TAXA	GENUS SPECIES	P\2\1	P\2\2	P\2\4	P\2\5	P\2\7	AVG	P\4\2	P\4\4	P\4\5	P\4\6	P\4\9	AVG	TOTAL
	Spinadis wallace				2		1				2	2	2	3
	Unknown sp. A (squatty bodies)													
	Unknown sp. B (slim guys)													
	Unknown sp. C													
	Unidentified								1				1	1
ODONATA														
	Argia sp.													
	Macromia sp.													
	Archilestes													
	Dromogomphus sp.		1				1							1
	Immatures													
PLECOPTERA														
	Perlinella ephyre													
	Immatures													
	Unidentified									1			1	1
TRICHOPTERA														
	Ceraclea													
	Macronema zebratum													
	Hydroptila sp.					1	1	1	2	2	1	1	5	6
	Oecetis sp.			1			1				2		1	2
	Chimarra sp.			2	2	3	3	4		7	3	2	4	7
	Polycentropus sp.									1			1	1
	Lype diversa													
	Unidentified													
AMPHIPODA														
	Synurella sp.													
ISOPODA														
	Asellus sp.													
ACARINA		1		1	4	5	4	1	3	5	5		4	8
MOLLUSCA														
PELECYPODA	Corbicula fluminea	2		2	3	3	4		2	3	1	4	4	8
GASTROPODA	Ferrissia rivularis							1					1	1
	Amnicola sp.													
	Gyraulus sp.													
	Unidentified													
OTHER										4			1	1
NEMATODA			2	2	3		3	5			1	1	3	6
NEMERTEA		1	1				2	1					1	3

Luxapalila Creek, Mississippi
Sampling Date: 10/1988
LX1088C

Counts of major taxa: raw data
(for those samples identified to species, counts are summed here, all others (*) are raw data)

TAXA	R/1/1	R/1/2	R/1/3	R/1/4	R/1/5	R/2/1	R/2/2	R/2/3	R/2/5	R/2/9	R/3/1	R/3/2	R/3/3	R/3/6	R/3/9	R/4/4	R/4/5	R/4/8	R/4/9	R/4/10
Turbellaria	3			2		3		3	5	1	1	2			2					1
Oligochaeta	16	18	20	21	33	23	25.6	7	15	19	37	39	28	47	42	8	17	16	26	9
Chironomidae	85	83	81	79	58	194	125	183	172	161	57	62	52	57	69	12	22	44	13	20
Ceratopogonid																4				
Coleoptera											1						1	1		
Ephemeroptera		2		1	6	1	2	1				2		4				10		4
Odonata																				
Plecoptera		2	4				1			2							2	3	1	
Trichoptera	1	2	1	1	2	7	1	11	7	17	2	3	8	7	7		6	8	4	
Amphipoda																				
Isopoda																				
Bivalvia	15	14	15	19	10	9	12	17	10	5	31	16	19	5	50	6	3		4	4
Gastropoda					9											2				
MINOR GROUPS																				
Acarina	17	12	29	25	13	30	33	24	27	28		5	16	16	12	2	9	12	10	7
Polychaeta																				
Hirudinea														1		1				
Empididae																				
Collembola																				2
Nematoda	2	3	7	3		1	8		1		1	1	3		3	7	2		2	2
Nemertea	1		2			4	1	2	2				1			3	1		1	
Aeolosomatidae																				
Tanyderidae																		2		
TOTAL	140	136	159	151	131	272	208.6	248	239	233	130	130	127	137	185	45	63	96	61	49

Luxapalila Creek, Mississippi														
Sampling Date: 10/88														
LX1088SQ														TOTAL
							FREQ						FREQ	FREQ
TAXA	GENUS SPECIES	R\2\1	R\2\2	R\2\3	R\2\5	R\2\9	R/2	R\4\4	R\4\5	R\4\8	R\4\9	R\4\10	R/4	10
PLATYHELMINTHES														
TURBELLARIA														
	Dugesia tigrina	3		3	5	1	4					1	1	5
	Planaria sp.													
	Unidentified													
ANNELIDA														
~~POLYCHAETA~~														
OLIGOCHAETA	Sparganophilus													
	Haplotaxidae													
	Lumbriculidae	4	3			2	3	6	6	1	20	4	5	8
	Naididae													
	Amphichaeta leydigi													
	Bratislavia bilongata													
	Bratislavia unindentata													
	Chaetogaster diaphanus											1	1	1
	Dero digitata													
	Dero furcata													
	Dero nivea	5	2	1	3	3	5							5
	Dero obtusa		2	1	8	3	4							4
	Dero trifida		2				1							1
	Dero sp.										3		1	1
	Homochaeta naidina													
	Nais behningi													
	Nais bretscheri													
	Nais communis													
	Nais pardalis	3	4	1	1	2	5	1		1			2	7
	Nais pseudobtusa	1					1			1			1	2
	Nais simplex	2					1		1				1	2
	Nais variablis	5	1			8	3							3
	Piquetiella michiganesis									9			1	1
	Pristina aquiseta								1	1			2	2
	Pristina leidyi											1		
	Pristina synclites													
	Pristina sp.											1	1	1
	Pristinella jenkinae													
	Pristinella longidentata													
	Pristinella longisoma													
	Pristinella osborni	1	1				2				1		1	3
	Pristinella sima													
	Slavina appendiculata		1				1							1
	Specaria josinae										1		1	1
	Stevensoniana trivandrama													
	Unidentified naididae	1					1							1
	Tubificidae													
	Aulodrilus limnobius													
	Aulodrilus piqueti										1		1	1
	Aulodrilus pluriseta													
	Branchiura sowerbyi		1	1			2							2
	Limnodrilus hoffmeisteri													
	Limnodrilus rubripenis	1					1							1
	Potamothris vejdovskyi													

TAXA	GENUS SPECIES	R\2\1	R\2\2	R\2\3	R\2\5	R\2\9	AVG	R\4\4	R\4\5	R\4\8	R\4\9	R\4\10	AVG	TOTAL
	Unidentified tubificidae		5	2	2		3							3
	Barbidrilus paucisetus								8				1	1
	Unidentified		2.6	1	1	1	4		1	3		1	3	7
HIRUDINEA	Helobdella elongata							1					1	1
	Actinobdella sp.													
	Unidentified													
AEOLOSOMATIDAE			1				1	1				2	2	3
ARTHROPODA														
INSECTA														
COLEOPTERA														
	Bidessus sp.													
	Stenelmis sp.													
	Halipus sp.								1	1			2	2
	Hydrochus sp.													
COLLEMBOLA														
	Isotomurus palustris													
	Sminthurides sp.													
	Unidentified											2	1	1
DIPTERA														
CHIRONOMID														
	Chironominae													
	Chironomus sp.													
	Cladopelma													
	Cryptochironomus fulvus													
	Cryptochironomus sp.							1					1	1
	Dicrotendipes neomodestus	27.72	5.2	14.66	21.06	13.18	5							5
	Dicrotendipes nervosus Type 1							1	2				2	2
	Dicrotendipes sp. 1													
	Endochironomus sp.													
	Glyptotendipes								1				1	1
	Harnischia sp.													
	Nilothauma babiyi													
	Parachironomus abortivus													
	Paracladopelma undine											1		
	Paralauterborniella nigrohalteralis								2				1	1
	Paratendipes albimanus													
	Paratendipes nudisquama													
	Phaenopsectra dyair													
	Phaenopsectra flavipes													
	Polypedilum convictum	15.84			3.51		2							2
	Polypedilum illinoense													
	Polypedilum nr. scaloenum			7.33		9.88	2	2	3	9	4		4	6
	Pseudochironomus sp.													
	Robackia sp.								3	2	5		3	3
	Stenochironomus sp.													
	Stictochironomus sp.													
	Xenochironomus sp.													
	Unidentified chironomini		2.6				1				1		1	2
	Tanytarsini													
	Cladotanytarsus sp.													
	Micropsectra sp.													
	Rheotanytarsus sp.	11.88			7.02		2			1	1		2	4
	Stempellina sp.													

TAXA	GENUS SPECIES	R\2\1	R\2\2	R\2\3	R\2\5	R\2\9	AVG	R\4\4	R\4\5	R\4\8	R\4\9	R\4\10	AVG	TOTAL
	Stempellinella sp													
	Tanytarsus coffmani							2					1	1
	Tanytarsus glabrescens	7.92		3.67	3.51	19.76	4	1		3			2	6
	Tanytarsus querlus	3.96					1			13			1	2
	Unidentified tanytarsini				3.51		1			1			1	2
	Orthocladiinae													
	Corynoneura celeripes													
	Corynoneura taris	3.96					1							1
	Corynoneura							1		1			2	2
	Cricotopus bicinctus	19.8	75.4	58.66	17.55	23.06	5					15	1	6
	Cricotopus									2			1	1
	Eukiefferiella sp.									2			1	1
	Nanocladius crassicornus	7.92					1							1
	Nanocladius distinctus		5.2			3.29	2							2
	Nanocladius rectinervis													
	Nanocladius minimus													
	Nanocladius sp.													
	Parakiefferiella sp.													
	Rheocricotopus sp.													
	Thienemannimyia								1				1	1
	Thienemanniella nr. fusca	63.36	13	80.67	87.75	85.65	5			4			1	6
	Thienemanniella xena	23.76					1							1
	Unidentified orthocladinae		5.2	7.33	7.02		3							3
	Tanypodinae													
	Ablabesmyia mallochi		2.6				1					1	1	2
	Ablabesmyia parajanta	3.96	5.2	3.67			3					2	1	4
	Ablabesmyia tarella													
	Clinotanypus													
	Labrundinia pilosella									2		1	2	2
	Macropelopia sp.													
	Natarsia sp							1					1	1
	Nilotanypus sp.													
	Pentaneura sp.													
	Procladius sp.									1	1		2	2
	Unidentified tanypodinae								1			1	1	1
	Potthasia													
	Unidentified	3.96	13	7.33	21.06	9.88	5	3	9	1		1	4	9
	Ceratopogonidae													
	Alluaudomyia sp.													
	Bezzia sp.													
	Unidentified							4					1	1
	Empididae													
	Hemerodromia													
	Tanyderidae									2	1		2	2
	Simuliidae													
	Simulium sp.									2			1	1
EPHEMEROPTERA														
	Baetisca sp													
	Caenis sp.													
	Ephemerella sp.													
	Tricorythodes sp.	1	1				2			3			1	3
	Cinygmula subaequalis													
	Stenonema sp.		1	1			2			7		4	2	4

TAXA	GENUS SPECIES	R\2\1	R\2\2	R\2\3	R\2\5	R\2\9	AVG	R\4\4	R\4\5	R\4\8	R\4\9	R\4\10	AVG	TOTAL
	Spinadis wallace													
	Unknown sp. A (squatty bodies)													
	Unknown sp. B (slim guys)													
	Unknown sp. C													
	Unidentified													
ODONATA														
	Argia sp.													
	Macromia sp.													
	Archilestes													
	Dromogomphus sp.													
	Immatures													
PLECOPTERA														
	Perlinella ephyre													
	Immatures													
	Unidentified		1			2	2		2	3	1		3	5
TRICHOPTERA														
	Ceraclea sp		1				1							1
	Macronema zebratum													
	Hydroptila sp.	6		6	4	16	4			4			1	5
	Oecetis sp.	1		4	2	1	4		4				1	5
	Chimarra sp.			1	1		2		2	4	4		3	5
	Polycentropus sp.													
	Lype diversa													
	Unidentified													
AMPHIPODA														
	Synurella sp.													
ISOPODA														
	Asellus sp.													
ACARINA		30	33	24	27	28	5	2	9	12	10	7	5	10
MOLLUSCA														
PELECYPODA	Corbicula fluminea	9	12	17	10	5	5	6	3		4	4	4	9
GASTROPODA	Ferrissia rivularis													
	Amnicola sp.													
	Gyraulus sp.													
	Unidentified							2					1	1
OTHER														
NEMATODA		1	8		1		3	7	2			2	4	7
NEMERTEA		4	1	2	2		4	3	1		1		3	7

APPENDIX D

SPECIES COMPOSITION IN SPRING, 1989 SAMPLES

Luxapalila Creek, Mississippi
Sampling Date: 6/1989
LX689cnt

Counts of major taxa: raw data
(for those samples identified to species, counts are summed here, all others are raw data)

	SITE																			
TAXA	P/1/2	P/1/5	P/1/6	P/1/8	P/1/9	P/2/3	P/2/4	P/2/5	P/2/6	P/2/7	P/3/3	P/3/6	P/3/7	P/3/9	P/3/10	P/4/3	P/4/5	P/4/7	P/4/8	P/4/10
Turbellaria	1			1			3	2	1			1								
Oligochaeta	19	11	14	20	32	1	1	3	1	6	17	13	15	11	16	9	0	0	1	1
Chironomidae	20	30	27	25	35	32	39	34	10	60	32	16	22	29	37	35	42	38	47	43
Ceratopogonid					2		1		1	1						1			2	
Coleoptera					1			1												1
Ephemeroptera							1							3	5				1	
Odonata															2			1		2
Plecoptera											1									
Trichoptera			1		1	1	1		3						1		1	1		2
Amphipoda									2	1				1						
Isopoda																				
Bivalvia			2	4	2	1	2	3	3		3									
Gastropoda			1							2										
MINOR GROUPS																				
Acarina						1					3		4		1		1	1	2	4
Heteroptera														1	1					
Polychaeta																				
Hirudinea	1																			
Empididae																	1			
Collembola		3		1																
Nematoda	4	7	5	5	2		3	1		6	1					11	6	2	9	2
Nemertea								1										1		
Simuliidae																				
Aeolosomatidae																				
Tanyderidae																				
TOTAL	45	51	50	56	75	36	51	45	21	76	57	30	41	45	63	56	51	44	62	55

Luxapalila Creek, Mississippi											
Sampling Date: 6/89											
Raw species data: LX689RAW											
		SITE									
TAXA	GENUS SPECIES	P\2\3	P\2\4	P\2\5	P\2\6	P\2\7	P\4\3	P\4\5	P\4\7	P\4\8	P\4\10
PLATYHELMINTHES											
TURBELLARIA											
	Dugesia tigrina		3	2	1						
	Planaria sp.										
	Unidentified										
ANNELIDA											
POLYCHAETA											
OLIGOCHAETA	Sparganophilus										
	Haplotaxidae										
	Lumbriculidae			1	1						
	Naididae										
	Amphichaeta leydigi										
	Bratislavia bilongata										
	Bratislavia unindentata										
	Chaetogaster diaphanus										
	Dero digitata										
	Dero furcata										
	Dero nivea										
	Dero obtusa										
	Dero trifida										
	Dero sp.										
	Homochaeta naidina										
	Nais behningi										
	Nais bretscheri										
	Nais communis										
	Nais elinquis										1
	Nais pardalis										
	Nais pseudobtusa										
	Nais simplex										
	Nais variablis										
	Piquetiella michiganesis										
	Pristina aquiseta					1					
	Pristina leidyi										
	Pristina synclites										
	Pristina sp.										
	Pristinella jenkinae										
	Pristinella longidentata										
	Pristinella longisoma										
	Pristinella osborni										
	Pristinella sima										
	Slavina appendiculata										
	Specaria josinae		1	1		2					
	Stevensoniana trivandrama	1									
	Unidentified naididae										
	Tubificidae										
	Aulodrilus limnobius										
	Aulodrilus piqueti										
	Aulodrilus pluriseta										
	Branchiura sowerbyi										
	Limnodrilus hoffmeisteri										
	Limnodrilus rubripenis										

TAXA	GENUS SPECIES	P\2\3	P\2\4	P\2\5	P\2\6	P\2\7	P\4\3	P\4\5	P\4\7	P\4\8	P\4\10
	Potamothrix vejdovskyi										
	Unidentified tubificidae			1		2					
	Enchytraididae					1				1	
	Barbidrilus paucisetus						8				
	Unidentified oligochaeta						1				
HIRUDINEA	Helobdella elongata										
	Actinobdella sp.										
	Unidentified										
AEOLOSOMATIDAE											
ARTHROPODA											
INSECTA											
COLEOPTERA											
	Bidessus sp.										
	Cyphon										
	Halipus sp.			1							1
	Hydrochus sp.										
	Stenelmis sp.										
COLLEMBOLA											
	Isotomurus palustris										
	Sminthurides sp.										
	Unidentified										
DIPTERA											
CHIRONOMID											
	Chironominae										
	Chironomus sp.		1								1
	Cladopelma										
	Cryptochironomus fulvus					1	2				
	Cryptochironomus sp.										
	Dicrotendipes neomodestus		1			1					1
	Dicrotendipes nervosus Type 1	3				2	5	9	8	4	10
	Dicrotendipes nervosus Type II					1					
	Endochironomus sp.		2								
	Glyptotendipes					1					
	Harnischia sp.			1				1			
	Microtendipes							2			
	Nilothauma babiyi				1						
	Parachironomus abortivus					1					
	Paracladopelma undine			1				2			
	Paralauterborniella nigrohalteralis	5	1	2	1	5	2		7	5	5
	Paratendipes albimanus										
	Paratendipes nudisquama										
	Phaenopsectra dyair							3	3	1	1
	Phaenopsectra flavipes		1					1			
	Polypedilum convictum										
	Polypedilum fallax	1									
	Polypedilum illinoense					1	1			2	
	Polypedilum nr. scaloenum	5	4	6	2	13	8	6	2	10	2
	Pseudochironomus sp.										
	Robackia sp.						5				
	Stenochironomus sp.										
	Stictochironomus sp.				1						
	Tribelos sp.	12		3			1			1	
	Xenochironomus sp.										
	Unidentified chironomini							2			

TAXA	GENUS SPECIES	P\2\3	P\2\4	P\2\5	P\2\6	P\2\7	P\4\3	P\4\5	P\4\7	P\4\8	P\4\10
	Tanytarsini										
	Cladotanytarsus sp.	1				1					
	Lauterborniella		2								
	Micropsectra sp.		5								
	Rheotanytarsus sp.		3							1	
	Stempellinella sp										
	Tanytarsus coffmani										
	Tanytarsus glabrescens		1		1						
	Tanytarsus querlus	5	10	11	1	24	7	9	10	11	8
	Unidentified tanytarsini										
	Orthocladiinae										
	Brillia									1	
	Corynoneura celeripes										
	Corynoneura taris								1	1	
	Corynoneura sp						1				
	Cricotopus bicinctus										
	Cricotopus trifascia										
	Cricotopus sp										1
	Eukiefferiella sp.									1	
	Nanocladius crassicornus										
	Nanocladius distinctus									2	2
	Nanocladius rectinervis										
	Nanocladius minimus								1		
	Nanocladius sp.			1							
	Parakiefferiella sp.		2								
	Rheocricotopus sp.										
	Thienemanniella nr. fusca										
	Thienemanniella xena										
	Unidentified orthocladinae							1			
	Tanypodinae										
	Ablabesmyia mallochi							1	1	1	1
	Ablabesmyia parajante				1		1	2	3	1	4
	Ablabesmyia tarella										
	Clinotanypus										
	Labrundinia pilosella								1		
	Macropelopia sp.										
	Natarsia sp										2
	Nilotanypus sp.										
	Pentaneura sp.										
	Procladius sp.			3	1	1			1	1	
	Thienemannimyia										
	Unidentified tanypodinae					2		2		1	2
	Diamesinae										
	Potthasia										
	Unidentified Chironomidae		6	6	1	6	2	1	1	3	3
	Ceratopogonidae										
	Alluaudomyia sp.		1								
	Bezzia sp.				1	1	1			2	
	Unidentified ceratopogonid										
	Empididae										
	Hemerodromia							1			
	Tanyderidae										
	Simuliidae										
	Simulium sp.										

TAXA	GENUS SPECIES	P\2\3	P\2\4	P\2\5	P\2\6	P\2\7	P\4\3	P\4\5	P\4\7	P\4\8	P\4\10
EPHEMEROPTERA											
	Baetisca sp										
	Caenis sp.										
	Ephemerella sp.										
	Isonychia										
	Tricorythodes sp.										
	Cinygmula subaequalis										
	Stenocron sp.		1								
	Stenonema sp.									1	
	Spinadis wallace										
	Unknown sp. A (squatty bodies)										
	Unknown sp. B (slim guys)										
	Unknown sp. C										
	Unidentified										
HETEROPTERA											
	Mesovelia										
ODONATA											
	Argia sp.										
	Macromia sp.										
	Archilestes										
	Dromogomphus sp.								1		2
	Immatures										
PLECOPTERA											
	Perlinella ephyre										
	Immatures										
	Unidentified										
TRICHOPTERA											
	Ceraclea										
	Macronema zebratum										
	Hydroptila sp.	1									
	Oecetis sp.		1		1			1			
	Chimarra sp.				2						2
	Polycentropus sp.										
	Lype diversa										
	Unidentified								1 1		
AMPHIPODA											
	Synurella sp.										
	Gammarus sp.				2	1					
ISOPODA											
	Asellus sp.										
ACARINA		1						1	1	2	4
MOLLUSCA											
PELECYPODA	Corbicula fluminea	1	2	3	3						
GASTROPODA	Ferrissia rivularis					2					
	Amnicola sp.										
	Gyraulus sp.										
	Unidentified										
OTHER											
NEMATODA			3	1		6	11	6	2	9	2
NEMERTEA				1					1		
TOTAL NUMBER PER CORE		36	51	45	21	76	56	51	44	62	55
NUMBER OF SPECIES		11	20	17	16	22	15	18	16	22	20

Luxapalila Creek, Mississippi
Sampling Date: 6/1989
LX689cnt

Counts of major taxa: raw data
(for those samples identified to species, counts are summed here, all others are raw data)

TAXA \ Site	R/1/1	R/1/2	R/1/4	R/1/5	R/1/10	R/2/1	R/2/5	R/2/6	R/2/7	R/2/8	R/3/1	R/3/2	R/3/4	R/3/5	R/3/7	R/4/1	R/4/2	R/4/8	R/4/9	R/4/10
Turbellaria		4											1							2
Oligochaeta	10	36	11	18	3	21	5	13	21	14	44	20	13	34	46	2	0	0	1	1
Chironomidae	4	10	6	4	4	56	6	37	75	20	34	38	6	338	39	17	14	8	12	23
Ceratopogonid																				
Coleoptera									1		1									1
Ephemeroptera					1	24		11	15	1	5	2	2	6	2					
Odonata																				
Plecoptera											2					3	1	2	1	4
Trichoptera	5	2				12		21	81	6	6	6	1	22	22				1	
Amphipoda		2																		1
Isopoda																				
Bivalvia	4	11												1						
Gastropoda	2																			
MINOR GROUPS																				
Acarina	2	1		1				5	7	1	1	1		15	6	3	1	1	1	2
Heteroptera								1												
Polychaeta																				
Hirudinea																				
Empididae																				
Collembola																				
Nematoda	4	4	2	4			4	2					6	13	3	7	4	7	4	1
Nemertea				1																
Simuliidae								4	33	1		1		1						
Aeolosomatidae																				
Tanyderidae																				
TOTAL	31	70	19	28	8	113	15	94	233	43	93	68	29	430	118	32	20	18	20	35

Luxapalila Creek, Mississippi											
Sampling Date: 6/89											
Raw species data: LX689RAW											
TAXA	GENUS SPECIES	R\2\1	R\2\5	R\2\6	R\2\7	R\2\8	R\4\1	R\4\2	R\4\8	R\4\9	R\4\10
PLATYHELMINTHES											
TURBELLARIA											
	Dugesia tigrina										2
	Planaria sp.										
	Unidentified										
ANNELIDA											
POLYCHAETA											
	Sparganophilus										
	Haplotaxidae										
	Lumbriculidae	4		1	3	1					
	Naididae										
	Amphichaeta leydigi			1							
	Bratislavia bilongata										
	Bratislavia unindentata										
	Chaetogaster diaphanus										
	Dero digitata										
	Dero furcata										
	Dero nivea										
	Dero obtusa										
	Dero trifida										
	Dero sp.										
	Homochaeta naidina										
	Nais behningi				1	1					
	Nais bretscheri										
	Nais communis										
	Nais elinquis										
	Nais pardalis										
	Nais pseudobtusa										
	Nais simplex										
	Nais variablis										
	Piquetiella michiganesis										
	Pristina aquiseta	3	3	1	3	6				1	
	Pristina leidyi										
	Pristina synclites										
	Pristina sp.										
	Pristinella jenkinae										
	Pristinella longidentata										
	Pristinella longisoma										
	Pristinella osborni	2		4							
	Pristinella sima										
	Slavina appendiculata										
	Specaria josinae										
	Stevensoniana trivandrama	4	1	1	5	5					
	Unidentified naididae										
	Tubificidae										
	Aulodrilus limnobius										
	Aulodrilus piqueti										
	Aulodrilus pluriseta										
	Branchiura sowerbyi										
	Limnodrilus hoffmeisteri										
	Limnodrilus rubripenis										

TAXA	GENUS SPECIES	R\2\1	R\2\5	R\2\6	R\2\7	R\2\8	R\4\1	R\4\2	R\4\8	R\4\9	R\4\10
	Potamothris vejdovskyi										
	Unidentified tubificidae	1	1	2		1	1				
	Enchytraididae										
	Barbidrilus paucisetus									1	1
	Unidentified oligochaeta	7		3	9		1				
HIRUDINEA	Helobdella elongata										
	Actinobdella sp.										
	Unidentified										
AEOLOSOMATIDAE											
ARTHROPODA											
INSECTA											
COLEOPTERA											
	Bidessus sp.										
	Cyphon				1						
	Halipus sp.										1
	Hydrochus sp.										
	Stenelmis sp.										
COLLEMBOLA											
	Isotomurus palustris										
	Sminthurides sp.										
	Unidentified										
DIPTERA											
CHIRONOMID											
	Chironominae										
	Chironomus sp.										
	Cladopelma										
	Cryptochironomus fulvus										
	Cryptochironomus sp.	1									
	Dicrotendipes neomodestus										
	Dicrotendipes nervosus Type 1										
	Dicrotendipes nervosus Type II										
	Endochironomus sp.										
	Glyptotendipes										
	Harnischia sp.			1							
	Microtendipes									1	
	Nilothauma babiyi										
	Parachironomus abortivus	1									
	Paracladopelma undine										
	Paralauterborniella nigrohalteralis							1			
	Paratendipes albimanus										
	Paratendipes nudisquama										
	Phaenopsectra dyair										
	Phaenopsectra flavipes										
	Polypedilum convictum			1							1
	Polypedilum fallax										
	Polypedilum illinoense								1		
	Polypedilum nr. scaloenum	2		2	1	2	1	3			
	Pseudochironomus sp.										
	Robackia sp.						2	2		5	5
	Stenochironomus sp.										
	Stictochironomus sp.										
	Tribelos sp.	1									
	Xenochironomus sp.										
	Unidentified chironomini						2				1

TAXA	GENUS SPECIES	R\2\1	R\2\5	R\2\6	R\2\7	R\2\8	R\4\1	R\4\2	R\4\8	R\4\9	R\4\10
	Tanytarsini										
	Cladotanytarsus sp.		1	2	2	1					
	Lauterborniella										
	Micropsectra sp.										
	Rheotanytarsus sp.	2	2	4	22	1				1	5
	Stempellinella sp										
	Tanytarsus coffmani	1									
	Tanytarsus glabrescens										
	Tanytarsus querlus	5			1						
	Unidentified tanytarsini										
	Orthocladiinae										
	Brillia										
	Corynoneura celeripes	9		1	3				1		
	Corynoneura taris	16		1	11	3					
	Corynoneura sp							1			
	Cricotopus bicinctus		1		2	1					
	Cricotopus trifascia								2		
	Cricotopus sp										1
	Eukiefferiella sp.										
	Nanocladius crassicornus	3									
	Nanocladius distinctus										
	Nanocladius rectinervis										
	Nanocladius minimus										
	Nanocladius sp.			1							1
	Parakiefferiella sp.										4
	Rheocricotopus sp.				1					1	1
	Thienemanniella nr. fusca	3		6	9	4				1	
	Thienemanniella xena	4		15	17	4		1			
	Unidentified orthocladinae						2	3			2
	Tanypodinae										
	Ablabesmyia mallochi										
	Ablabesmyia parajanta	1									
	Ablabesmyia tarella										
	Clinotanypus										
	Labrundinia pilosella										
	Macropelopia sp.										
	Natarsia sp										
	Nilotanypus sp.	5		2	4	3					
	Pentaneura sp.										
	Procladius sp.										
	Thienemannimyia										
	Unidentified tanypodinae	1									
	Diamesinae										
	Potthasia										
	Unidentified Chironomidae	3	2	1	2	1	1	3	1	1	2
	Ceratopogonidae										
	Alluaudomyia sp.										
	Bezzia sp.										
	Unidentified ceratopogonid										
	Empididae										
	Hemerodromia										
	Tanyderidae						9		3	3	
	Simuliidae			4		1					
	Simulium sp.				33						

TAXA	GENUS SPECIES	R\2\1	R\2\5	R\2\6	R\2\7	R\2\8	R\4\1	R\4\2	R\4\8	R\4\9	R\4\10
EPHEMEROPTERA											
	Baetisca sp										
	Caenis sp.										
	Ephemerella sp.										
	Isonychia				2	1					
	Tricorythodes sp.										
	Cinygmula subaequalis										
	Stenocron sp.										
	Stenonema sp.	24		7	6						
	Spinadis wallace			3	3						
	Unknown sp. A (squatty bodies)										
	Unknown sp. B (slim guys)										
	Unknown sp. C										
	Unidentified			1	4						
	Mesovelia			1							
ODONATA											
	Argia sp.										
	Macromia sp.										
	Archilestes										
	Dromogomphus sp.										
	Immatures										
PLECOPTERA											
	Perlinella ephyre										
	Immatures										
	Unidentified						3	1	2	1	4
TRICHOPTERA											
	Ceraclea										
	Macronema zebratum										
	Hydroptila sp.										
	Oecetis sp.				73					1	
	Chimarra sp.	12		19		6					
	Polycentropus sp.				8						
	Lype diversa										
	Unidentified			2							
AMPHIPODA											
	Synurella sp.										
	Gammarus sp.										1
ISOPODA											
	Asellus sp.										
ACARINA				5	7	1	3	1	1	1	2
MOLLUSCA											
PELECYPODA	Corbicula fluminea										
GASTROPODA	Ferrissia rivularis										
	Amnicola sp.										
	Gyraulus sp.										
	Unidentified										
OTHER											
NEMATODA			8	2			7	4	7	4	1
NEMERTEA											
TOTAL NUMBER		115	19	94	233	43	32	20	18	20	35
NUMBER OF SPECIES		24	8	28	26	18	11	10	8	11	17

APPENDIX E

COUNTS OF MAJOR TAXA, PER CORE SAMPLE, COLLECTED FROM SITE 4 IN THE FALL OF 1989

Table E1. Counts of Major Taxa, per Core Sample, Collected From Site 4 in the Fall of 1989

Major Taxa	Pool Samples					Riffle Samples				
	1	3	4	6	9	2	3	5	7	9
Oligochaeta	1	4	1	3			1	1		
Chironomidae	15	59	78	100	42	30	19	18	21	13
Ceratopogonidae				1	3					
Coleoptera									1	1
Ephemeroptera		1								
Acarina					2	1				
Nematoda	2		2	2	1					
Nemertea					2					

Table E2. Species Composition of Oligochaetes and Chironomids Collected From Site 4 in Fall 1989

Taxa	Pool Samples					Riffle Samples				
	1	3	4	6	9	2	3	5	7	9
Oligochaeta										
Naididae										
Dero furcata		1		2						
Pristina leidyi								1		
Specaria josinae		2								
Tubificidae										
Unidentified			1				1			
Chironomidae										
Chironominae										
Chironomus sp.			1							
Dicrotendipes nervosus II			1							
Harnischia sp.										
Phaenopsectra dyari	3	27	38	33	17					
Phaenopsectra flavipes	1	5	10	3	6					
Polypedilum fallax			1							
Polypedilum illinoense		1			1					
Polypedilum nr. *scaloneum*	11	4	20	8	7	8	8	4	6	7
Robackia sp.						21	9	12	14	6
Tanytarsini										
Tanytarsus querlus			2	2	1					
Tanypodinae										
Ablabesmyia parajanta		5		1	3					
Procladius sp.			1							
Orthocladinae										
Coryoneura celeripes							1		1	1
Coryoneura taris						1			1	1
Thienemannimyia sp.			1							
Thienemanniella nr. *fusca*					1					